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The AUTOMOBILE and Automotive Industries

VOL. XXXVII NEW YORK—THURSDAY, AUGUST 9, 1917—CHICAGO No. 6

Motorcycle Men Develop Army Standards

Engineers and Manufacturers at Annual Convention Vote for Centralized Control and Operation of Military Motorcycles—Recommend Establishment of Schools

By P. M. Heldt

ATLANTIC CITY, N. J., Aug. 6—The annual convention of the allied cycle and motorcycle industries opened here to-day at the Traymore Hotel and will continue until Thursday of this week. About 100 delegates registered on the opening day. Participating in this event are the Bicycle Manufacturers' Assn., Cycle Jobbers' Assn., Cycle Parts and Accessories Assn., Motorcycle and Allied Trades Assn., and the United Cycle Trade. The gathering is of a dual nature, a number of sessions being devoted to a consideration of business matters, while plenty of entertainment and recreation are also afforded by the four days' program. None of the associations represented is of a technical character and no engineering questions were dealt with at the convention proper. The latter, however, was preceded by a meeting of the Military Motorcycle Standardization Committee, which has been organized with the co-operation of the Society of Automotive Engineers. M. W. Hanks, Standards Manager of the Society of Automotive Engineers, is chairman of this committee, and as he had to leave in the afternoon for Fremont, Neb., where a tractor standardization meeting is on the program for the latter part of this week, the meeting was called for 9.30 a. m. Unfortunately some of the members of the committee who came from a great distance were delayed by lateness of their train, and it was about an hour later before the meeting could be called to order.

Chairman Hanks called upon Captain Hicox of the Motor Transport Department of the U. S. Army to address the committee. Captain Hicox stated that he had had about a year's experience with a motorcycle company in Texas. This was the first motorcycle company ever organized by the U. S. Army. There were two possibilities in organizing this company. One was to take the regular private soldiers and develop them into motorcyclists by a properly arranged system of instruction, and the other was to select men who had motorcycle experience, that is, private owners of motorcycles or repairmen who had

Motorcycle Meeting Recommendations

1—Centralized Control and Operation for Military Motorcycles.

2—Unit Organization to Insure Maximum Efficiency.

3—Development of Motorcycle Companies with Trained Officers and Men.

4—Exercise by President Wilson of Power to Create Such Companies.

5—Establishment of Training Schools for Men and Officers.

done work on motorcycles, and try to make soldiers out of them. The first alternative was chosen, and with very indifferent success. One reason for this was that the class of men available from which to choose the drivers was not of a very high mentality, at least not from a mechanical standpoint. Besides, the motorcycles were not subjected to the control that should have been exercised. The operators would use their machines for their own convenience when they were off duty, and partly as a result of this about eight machines out of ten were constantly out of repair, and the motorcycle got a black eye in the army. It was found that in order to prevent unauthorized use of the machines it was necessary to establish a guard at the camp which checked the motorcyclists in and out. The conclusion was reached that it is absolutely necessary to have centralized control, and that the check on the drivers must never be relaxed if trouble is to be avoided. On the border the motorcycles were used in small groups attached to various units of the army—six here and six there. This does not permit of effective control and is a source of constant trouble.

Side Cars for Mounting Guns

It is considered necessary, in order that motorcycles may be used by the army to the greatest advantage, to establish motorcycle training camps, the same as aviation training camps are being built in various parts of the country. A thorough course of instruction is given in these aviation training camps, and the motorcycle branch of the army should be developed in the same thorough manner. Of the men recently drafted a great many have motorcycle experience, and some of these should be assigned to act as instructors to motorcycle operators.

In the experiments on the border it was found that a motorcycle cannot be successfully used as a machine-gun mount. The gun mount must be transported by the motorcycle, then dismounted and the motorcycle be taken back to a place of safety. Several manufacturers of motorcycles were requested by the Government to build side cars for mounting machine guns, but no practical results have been achieved along this line. One feature of the experience on the border was that the men trained from the bottom up proved to be the best motorcycle drivers, and the advantages of this system of training were emphasized by the experience with one man who said he had used all the different makes of motorcycles and who nevertheless proved absolutely useless.

Establish Training Camps

Motorcycle training camps should be established to train or instruct operators in the mechanical end of motorcycles. They should be laid out on a scale to permit of turning out 10,000 properly drilled riders in 30 weeks. This would be only a beginning. What would be required later would depend on the duration of the war. From the experience of the British Army it is known that the casualties among motorcycle despatch bearers and machine gun transport operators are relatively as high as among the men of the infantry and the artillery. One of the reasons for this is that the drivers of heavy transport vehicles have instructions not to turn out for anything, and it has happened that entire squads of motorcyclists have been caught on impassable roads and been practically wiped out.

On the question of machine gun mounts, W. S. Harley, of the Harley-Davidson Motor Co., pointed out that the Lewis gun is the standard type of light machine gun, and that it comes in a leather trunk 52 in. long by 19 in. high by 13 in. thick, and that the weight of the gun, the trunk and the several accessories coming with the gun is 83 lb. The Ordnance Department wants a side car body that mounts the gun without the trunk. A reserve supply of ammunition, which weighs 64 lb. per 100 rounds, must also be transported by motorcycle. Mr. Harley's idea is that the machine gun should be either strapped to the side of the motorcycle or provided with a tripod and mounted on a side car. The total load transported by motorcycle should not exceed 500 lb.

Time for Centralized Control

It was brought out that the time is now ripe for the establishment of a statutory organization having control of all motorcycle work, and that the National Defense Act passed on June 3 last grants the President authority to create such a body. The great need is for thorough training of motorcycle operators and effective control. A committee of two was appointed to draw up a resolution to be presented to the Secretary of War, by another committee appointed for the purpose, to urge upon him the necessity of organization and centralized control. This committee retired and drew up the following resolution, which was approved by the meeting:

WHEREAS, at a meeting of the Motorcycle Manufacturers, upon request of the Motor Transportation Branch of the United States Army for the purpose of standardizing motorcycles and parts thereof, it has been brought to the attention of the manufacturers that the existing necessity of organization and centralized control of military motorcycles is very great, and whereas this necessity of organization is deemed fully as important as the standardization of the machines:

Be it therefore resolved that motorcycles in military use MUST be under centralized control and operation if the maximum efficiency is to be obtained;

That to obtain centralized control unit organization is a primary and important factor;

That motorcycle companies should be established with specially trained commissioned personnel and enlisted men;

That this organization should come into existence through the powers vested in the President of the United States by the Act of June 3, 1917, known as the National Defense Act;

That schools should be established for the training and instruction of officers to command the companies, and for enlisted men in the duties of soldiers and motorcycle drivers.*

The minutes of the meeting held in New York on June 28 were read by Mr. Hanks, and were approved, except for the fact that the dimensions on some of the drawings of standards are to be revised. There was some uncertainty as to the diameters of repair spokes. Two different sizes of spokes are in use by the Hendee Mfg. Co., and the Harley-Davidson Co. uses a spoke slightly larger than the larger one of these. The larger Hendee spoke, which has diameters of 0.120 and 0.148 in., was adopted for a standard repair spoke.

Proposed Standard Wheel and Rim

Frank Schwinn of the Excelsior Motor Cycle Co. submitted a drawing of the proposed standard wheel and rim. This design comprises the standard CC rim which has been used by all motorcycle makers for at least three years drilled with forty 17/64-in. spoke holes. Mr. Hanks here pointed out that if the members of the sub-committee would send in their drawings sufficiently early they would be duplicated at the S. A. E. office and the copies distributed among motorcycle makers before the meeting, so that their criticisms could be

*In the event such training schools are established the manufacturers will be glad to co-operate by furnishing mechanical experts to assist in instruction work.

Motorcycle Men at Atlantic City

T. W. HENDERSON
Henderson Motorcycle Co., President Motorcycle & Allied Trades Assn.

T. C. BUTLER, Jr.
Special representative, Hendee Mfg. Co.

OSCAR HEDSTROM
Chief Engineer Hendee Mfg. Co.

CAPT. F. C. HICOX
Sixty-first Infantry

ARTHUR DAVIDSON
Vice-President Harley-Davidson Motor Co.

W. S. HARLEY
Secretary and Treasurer Harley-Davidson Motor Co.

E. W. ROTTWEILER
General Manager, Paramount Motor Co.

FRANK W. SCHWINN
Vice-president and General Manager Excelsior Motorcycle Co.

M. W. HANKS
Standards Manager S. A. E.

HENRY E. HAWS
Manager Cycle Tire Sales, Firestone Tire & Rubber Co.

D. R. PERKINS
Manager Motorcycle & Allied Trades Assn.

laid before the meeting of the committee members.

The tire size previously adopted, viz., 28 by 3 in., was approved.

In regard to spark plugs, the size of thread was approved and it was agreed that there was no occasion for limiting the height of the plug.

The headlamp mounting lug was adopted in the form shown by the accompanying sketch. Mr. Schwinn pointed out that the present lamp lugs do not conform to the new standard, and that therefore the drawing should be put into the hands of the manufacturers at the earliest possible date. Some changes were made in the design of the headlamp support prong. It was decided to use a 3/32-in. spring washer and, as the nut is 21/64 in. high, it was also decided to increase the length of the threaded shank to 1 19/32 in. and to make the maximum diameter of the shoulder at the bottom of the shank 5/8 in. The prong as adopted is shown herewith. The lock washer to be used is the S. A. E. standard light series 3/8 in. and the nut a 3/8-in. S. A. E. standard.

Magneto Mountings and Drives

There was also some discussion regarding magneto mountings. The magneto is to be secured to its base by four cap screws at the corner of a 50 mm. square, the shaft where the coupling goes is to have a maximum diameter of 13 mm. and the tapered portion is to have a taper of 1:5 for a length of 9 mm. This corresponds approximately to an angle of 11 deg. 30 min. There was to be a Woodruff key of the special motorcycle magneto type, but, inasmuch as the present largest maker of motorcycle magnetos has recently been using a different size of key and there is therefore no absolute uniformity of practice, it was decided to hold this matter in abeyance and to see whether it is not possible to use a standard size Woodruff key.

The proposed standards covering throttle control, chains, spark control, clutch pedal location, kick starters and grease cups were adopted.

Tube Joints Still Under Discussion

A great deal of discussion was precipitated over the matter of tube joints. The S. A. E. has standardized flared tube joints, but this type is not in use to any extent on motorcycles, and the general opinion among the manufacturers' representatives is that, owing to the much greater vibration on motorcycles, this joint will not stand up. Captain Hicox reported that the soldered joints now commonly used on motorcycles gave much trouble on the Mexican border. To avoid misunderstanding, it may be pointed out that by soldered joint is not meant a joint permanently soldered up, but a joint consisting of a sleeve soldered to the end of the tube, which sleeve is provided with a conical surface and a circumferential flange, and over this sleeve is placed a gland nut which screws over the fitting to which the tube is to be connected. Captain Hicox stated that the trouble with these soldered joints was not that the tubes broke, but that they pulled out of the sleeves. In repairing these faults the motorcycle drivers would remove the sleeves, flare out the ends of the tubes as well as the crude tools at hand permitted, and then draw up the nut over these flared ends. Very often, however, the joint was not absolutely tight.

Various remedies were suggested. One was to make the soldered joints to the sleeve much longer than at present. Another was to braze the tubes in the sleeves instead of soldering them, a method the objection to which is that in case of a break a repair cannot be effected with the same ease as in the case of a soldered joint, as brazing outfits are not nearly as common as soldering outfits. Mention was made of a double conical joint used on the Stewart vacuum tank outfit, which was said to give very good results. The discussion was ended by Mr. Harley agreeing to make up several sets of joints of different design and submit them to endurance tests in a vibrating machine at his factory. He will report on the result of these tests at the next meeting.

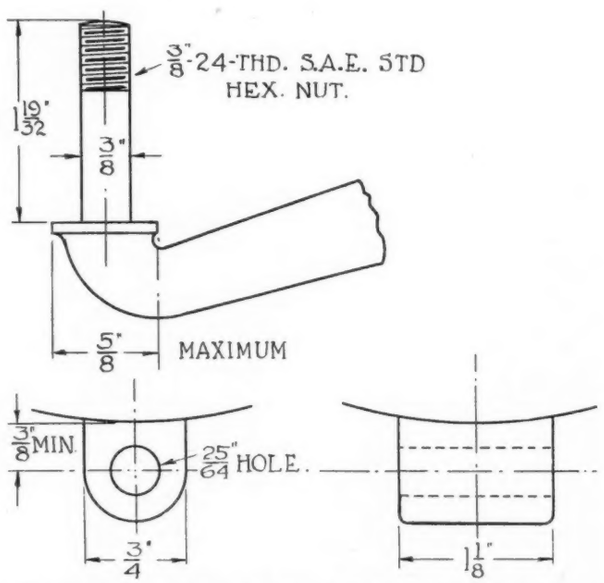
A Field for Light Machines

The last topic taken up was that of cubic inches piston displacement; in other words, the size of the engine and the cycle. This question had been settled in a preliminary way at the previous meeting by deciding upon a displacement of 61 cu. in., but was reopened by Mr. Hanks, partly for the reason that letters had been received from a number of manufacturers inquiring why the Government could not use their smaller machines, especially for light work like dispatch bearing. G. V. Rottweiler of the Paramount Motor Co., Columbus, Ohio, mentioned that the British army makes extensive use of the Douglas light motorcycle.

Further discussion of this matter brought out the fact that the Douglas machine used is not the stock machine, but a special design with a three-speed gear. This is light enough so it can be lifted out of shell craters, and powerful enough to develop the necessary speed. It was decided to give this matter of the need for lighter machines further consideration at the next meeting, and those favoring these machines were asked to draw up what they considered suitable specifications for such machines, for presentation at the coming meeting.

Another meeting of the Military Motorcycle Standardization Committee will be held at the Congress Hotel, Chicago, on Monday, Aug. 27, at 9 a. m.

The convention was otherwise successfully conducted. Much of the credit is due to F. T. Chase of the Frank Mossberg Co., chairman of the entertainment committee, and C. E. Morehouse of the Standard Co., secretary of the Cycle Parts and Accessories Assn. The program of entertainment provided for golf games on the Atlantic City Country Club links, bathing at the Brighton Casino, a theater party, ladies' reception, etc.



The above illustrations show the lamp support prong and lamp bracket standard which were finally approved by the committee

War Changes German Design

Practically All Cars and Trucks in Military Service. Construction Is Light Without Sacrificing Strength. Wheelbases Have Been Made Longer Than Before War. Motors Are Block Cast and Ratios Are Now Lower. Lack of Rubber Makes Tire Supply Problem Puzzling. Tractors Built Like American Types Give Good Results.

By E. A. Langdon

AUTOMOBILE design as now prevalent in Germany shows a considerable change during the past 30 months. Of course, in speaking of automobiles in Germany, one might as well say automobiles of the German army; there are few others left. The cars, as stated in a former article, are made as light as possible without sacrificing too much strength; the wheelbase is elongated and the tread of cars built for months past standardized at railroad gage. Motors are preferably block cast with a lesser ratio than before the war, to save metal.

Tires—wherever they are used—are made of an "Ersatz" (substitute), as are so many things in the Germany of to-day. But a great many solid tires are used, suspension of the cars being so improved as to make up for the loss of elastic materials.

Many air-cooled motors are used, not so much for the reason of saving material—as there are radiators made entirely of aluminum, which metal is plentiful in Germany—as to eliminate trouble with the radiator unit. Motor and driver's seat are put as far in front as possible, so as to give a maximum capacity to the body. Carbureters are mostly automatic.

The part of the car which receives most attention in construction is the steering equipment. This is now made as strong as possible and of the best material which can be used. Army drivers say unanimously that there is now not one-fourth the trouble with steering gears compared to what occurred in the first year of the war, on a basis of mileage and average roadway.

The great importance of the automobile branch of the transportation department of the German army has been emphasized again and again, and among the millions of soldiers in the service of the Central Powers there is not one, from private to field marshal, who denies its inestimable value. Officers who are experts in transportation assert that, while the work of Germany's automobiles has been less spectacular, it is no less important than was that of the unprecedented, powerful guns which, at the opening of the war, Germany put forward in the west, and later on used again for the leveling of Russian fortresses. It was on the eastern field, in fact, that the work of the automobile was most conspicuous, for, while in France it forms only an adjunct to an elaborate and highly efficient railway system, the motor vehicle in the East assumed almost completely this rôle. All the eastern successes of the Germans, from the first rolling back of the Russians to Warsaw until the Rumanian campaign, were in a high degree due to the use of automobiles as a transportation means. It is significant that only where automobiles could play such a part, German campaigns could be developed according to traditional strategic principles and resolved themselves into trench warfare only after a certain position required by the German general staff was gained, such as the present line in Poland and Rumania, as well as the Macedonian front in the Balkan campaign of 1915.

The Rumanian campaign is in fact the most brilliant illustration of the possibilities of the automobile in modern warfare. In a country the railroad system of which was planned—so far as it was at all of a strategic nature—against Russia rather than against Central Europe, the Germans had to fight an enemy on a front of more than 500 miles, a great deal of which is mountainous and well fortified in many places. When it is considered that at the time of Rumania's entrance into the war Austria-Hungary was utterly unprepared for the new enemy's action so that the Rumanians in the first few days rushed into Transylvania with hardly any opposition at all, the system which could overcome such difficulties and turn them to advantage within less than a month must seem highly efficient.

The manner in which this was done is well known to-day. By applying a kind of vise, the jaws of which were formed by the respective armies of Falkenhayn in Transylvania and of Mackensen in Southern Rumania, the kingdom's army was forced to retire from the southwestern section which juts out between Bulgaria and Hungary past Bucharest toward East and North. This

EDITOR'S NOTE—Remarkably efficient as we know the German army to be, this article by Mr. Langdon brings out strongly the importance of the automobile, truck and tractor in its organization. In our war with Germany it behooves us to profit by her experiences, and such information as Mr. Langdon supplies, in this article and others to follow, should prove useful.

Automobile preparedness in Germany in relation to that in the United States and the need of roads in eastern Europe are two other subjects treated by Mr. Langdon. These articles, which were sent from Denmark after the author's return from a sojourn in Germany, will appear in early issues of THE AUTOMOBILE AND AUTOMOTIVE INDUSTRIES.

retreat could hardly be carried out with sufficient speed for the Rumanians, thousands of whom were captured daily for weeks, while they lost most of their equipment before they came to a standstill before Galatz. The German rate of progress, due to their automobile equipment, was such that even what railways the Rumanians found at their disposal were utterly insufficient for the requirements of their retreat.

20,000 Automobiles in Rumanian Drive

It is estimated that from one-half to three-quarters of a million soldiers participated in the Rumanian drive while it was at its height. The number of automobiles employed can only be guessed at, but is put by fairly well-informed sources at from 15,000 to 20,000. This would enable about 200,000 men to have moved at automobile speed, and, with their abundant equipment in field artillery and machine guns, to perform on a smaller but more effective scale the work of a "steam roller." Of course, the remainder of the armies were not without means for transportation, either; and by means of heavy motor vehicles as well as Rumanian railways made efficient by improvised small-gage military railways they were able to follow the advance guard with all required speed.

Another great advantage of "automobile warfare," as this section of eastern fighting may be properly termed, is the exceedingly small number of casualties suffered by the armies having superior equipment. While in this instance, too, exact figures are not available, military observers place the rate of loss for the Germans at about one-third of what it was during the Serbian campaign. This is due not only to the fact that the Serbians are vastly braver than the Rumanians, and in spite of insufficient equipment put up a splendid fight, but because of the territorial advantage enjoyed by General Mackensen's army. Germans make no secret of this fact, and point to it as an indicator for the success of a rumored advance made later toward Odessa. This, however, the German general public hope will not be necessary, as they expect peace negotiations to begin about Jan. 1, 1918, and if they should fail to materialize or to bring results, look forward to a German drive in the west in the early spring, which, coupled with "thorough" sea warfare, they still hope will bring about the end of the war.

Carburetion Gives Trouble

The principal trouble automobiles have had for the past 1½ years lies in carburetion. Carbureters, and hence motors, do not work at their best under prevailing atmospheric conditions, which are abnormal, inasmuch as Europe has had an unusual quantity of rain and snow for many months past. Nevertheless, the fuel economy of army automobiles is good, and, to the surprise of the management of this department, still improving. One astonishing fact is that the average army driver shows no tendency to drive, just to "deliver the goods" irrespective of the cost; but most of them do their utmost to minimize the consumption of fuel and oil by their machines in order to make the fatherland's resources go as far as possible. This shows to what a degree the marvelous military training influences the thinking of these soldier-drivers. The spirit of economy, by the way, is aided by a most efficient system of keeping track of the work and requirements of automobiles used by the armies of the Empire.

To return to the near-eastern campaign, the machines used—aside from those serving as carriers of ordnance—can be divided into three classes: Light trucks and passenger vehicles for the transportation of infantry troops; light and medium-weight trucks used for bringing up supplies of all kinds for these bodies of troops as they advance; heavy trucks representing a movable army base of supplies. It goes without saying that these groups are co-operating in the most intimate manner. Nevertheless, a machine cannot be detached from one branch of work and shifted to the other except by order of at least the head of the regimental automobile department. If this strict system of responsibility does not result—and it does not—in a loss of efficiency and promptness, this is due to the most intimate contact between the automobile and troop branches of the different army sections, whether it be a regiment or a division or a corps. The system whereby this effect is attained is as thorough as can be imagined without degenerating into "red tape." Of course, the execution of this system depends on the full realization of its essential features by each soldier attached to the automobile branch. Attention will be given to this point later on.

Tractors Render Important Service

One class of automobile which is not heard of very much in general and which nevertheless renders highly important service is the tractor. There are several types in use, and it should be gratifying to Americans to learn that they have been designed along fundamentally American lines. There are three-wheel tractors of heavy capacity, as well as four-wheel creeper designs for both light and heavy work. The heavy tractors are used chiefly for the transportation of ordnance and large supply loads, especially over open fields; the lighter tractors supplement this work, but are also used extensively for agricultural work. For the German army works not only in a military way, but the troops behind the front serve in their spare time to increase the production of German soil. This has a threefold advantage: the peasant troops are able to utilize their time to best advantage at a kind of work which they love; other soldiers become acquainted with agricultural work carried out in efficient style, so that the country, when the war is over, will still possess millions of men adept in this work; all the ground held by the Central Powers is utilized as effectively as possible. Even to such a point, Germany is obliged to the motor vehicle; and the whole population realizes this, for whereas in the past millions of the country people held a slight—and sometimes more than a slight—distrust toward the motor vehicle the whole country now appreciates its value, and, if it is possible, loves the automobile almost with as much feeling as was formerly entertained for the horse. This illustrates in a strange way the degree to which the utilitarian and the sentimental are blended in the German mind.

Few Motor Vehicles Outside Army

Another mode in which the automobile has shown its value is where it was conspicuous by absence. It has been stated that only the worst vehicles, and not many of them, are used in the interior of the Empire, except where trucks are needed for transporting products for the national household. The result is that where transportation is required for merchandise of other than military importance, the facilities are very poor. No one doubts that with a sufficient number of automobiles on hand this difficulty could be greatly alleviated; but this cannot be done, both because the army requires every good machine it can get, and because it is necessary for Germany to economize with fuel of every sort. For, with the ever-decreasing force of laborers, even the supply of coal is slowly falling off, while military and naval preparations call for ever-greater expenditures of energy in every form.

While this condition exists, and looking forward to a

most active future after the war, Germany is preparing to prevent the recurrence of such difficulties if ever a similar situation should arise in Europe. Her eyes are turned, in this respect, chiefly toward Turkey. The Ottoman Empire is to be transformed not only into the "Kornkammer" (granary) of the Central Powers, but the production of industrial alcohol right there is planned on a most extensive scale. Already the colonial offices are designing plans on a large scale for the creation of this industry in Turkey, which will give employment to many thousands of German families and will raise the prosperity of the hitherto pauperized land of the Sultan. This will not only solve once and for all time the liquid fuel problem of the Empire, but will open up Turkey as a rich market for the products of European industry. Similar plans are under way for the best utilization of Austro-Hungarian and Balkan resources.

Military Influence on Design

All protestations of officials to the contrary, the spirit of preparation for future embroglios will hardly be abated in post-bellum Germany; or, to say the least, the State will take an influential hand in the production of most important utensils. This will, without a doubt, include the manufacture of automobiles. Therefore, whether a State subsidy go with every car sold to a user, or not, automobiles will be built principally along lines which during the present war will have proved successful and useful from a military point of view; the combination of automobile makers will very likely have the constant aid of military advisers; and all possible efforts will be made to render the manufacture and operation of motor vehicles quite independent of resources beyond Germany's reach. This will, of course, call for selection of materials, and, in fact, for a thorough revamping of automobile-building ideas, which engineers have not found sufficient time to undertake during the war. The internal combustion motor, ignition, power transmission, suspension and traction will very likely be changed, if not fundamentally, at any rate very materially. Engineers expect that within 5 years Germany will produce automobiles, both of passenger and commercial types, which will be radically different in appearance from the types now existing. Just in what direction this development is to go no one dares to foreshadow; but it is a foregone conclusion that even in the development of passenger cars utility will be the first, second and third consideration, before appearance.

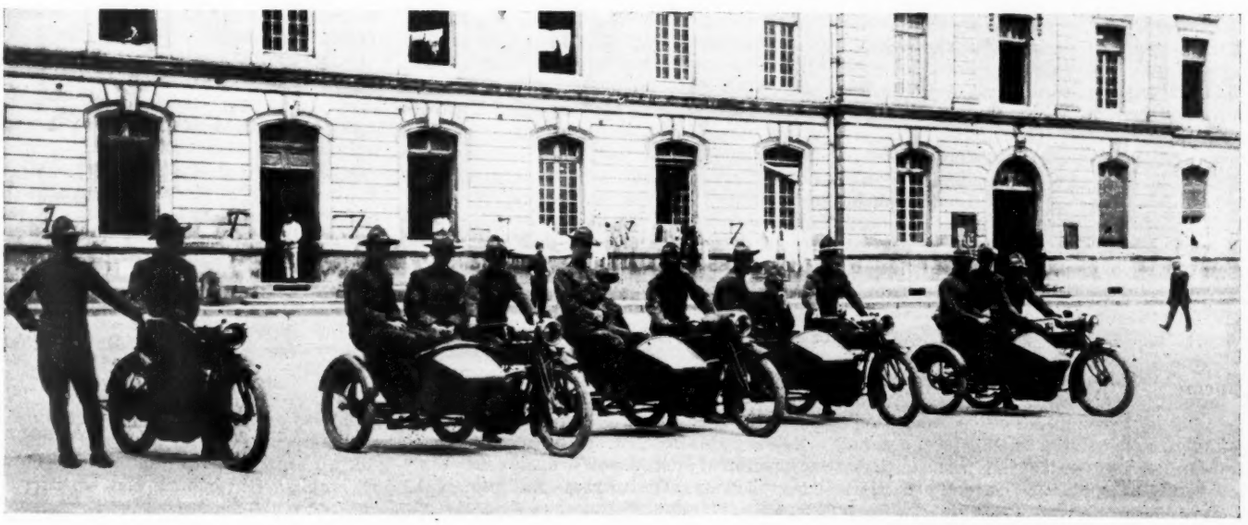
One of the great problems still unsolved seems to be that of tires. As the war goes on tires grow fewer and fewer, and wooden wheels assisted by special suspensions take their places. This would seem to indicate that synthetic rubber is not as perfect a proposition as it seemed a year ago, and that a great deal of natural rubber was held in stock by the Government to be used up by and by. It would only be surprising if the question of perfect rubber reclamation had not been solved more effectively than before the war. Very likely it is a discovery in this line which accounts for the long time Germany's stores of rubber have lasted in spite of the rigid exclusion of all rubber through the British blockade.

The metal question, so far as the automobile is concerned, has not made very much headway in 18 or 20 months. Lightweight alloys have taken the place of steel and copper in many cases; and sometimes, as in the case of frames, even wood with steel-brace reinforcement has been used. Effective as these makeshifts might be, there is hardly a doubt, however, that they will disappear very soon after normal economic conditions are restored and Germany will once more have to compete with the world market. Steel will come into its own once more, almost completely; but it is quite possible that aluminum and its alloys will take the place of copper in many instances, excepting always the use of the latter metal as an electrical-current conductor. It is in this field that the copper shortage is most painfully felt by the Central Powers. As industrial activity becomes intensified to carry on the war, more and more electrical installations of every kind are required, and with the imports of copper almost nil, the metal must be taken from every form in which it is found at present.

After the War

Finally, as to the automobile market here after the war, this subject has been taken up before, and all the remarks then laid down hold good now, and very likely will do so when the times of peace return. With Europe's resources growing weaker day by day, it is quite certain that America will be heavily called upon to help the work of reconstruction. Preparation should be made by automobile interests in America to take hold of the continental automobile market as soon as communications are reestablished.

American Motorcycle Corps in Service in France



Specifications for 55-Hp. Track-Laying Type Artillery Tractors

Instructions to Bidders and Special Specifications Governing Manufacture Prescribed by Ordnance Department of U. S. Army

WASHINGTON, Aug. 7.—*Special to* THE AUTOMOBILE AND AUTOMOTIVE INDUSTRIES.—Specifications for the manufacture of 55-hp. track-laying type artillery tractors have been issued by the Ordnance Department of the United States Army, over the signature of Brigadier General Crozier, Chief of Ordnance. Instructions to bidders and specification details are complete to the most minute detail, including provisions of contracts, features of equipment, and particulars of painting required. Instructions to bidders and specifications follow in full:

INSTRUCTIONS TO BIDDERS

1. The tractors for which proposals are invited must conform in quality, material, workmanship, and dimensions to the specifications furnished by the Ordnance Department.

2. Bidders will state a price for each tractor and the time within which it will be delivered. In fixing the date or dates of delivery for material in the contract, time will be computed from the date of receipt by the contractor of notification of award.

3. Copies of the advertisement, of these instructions to bidders and general specifications, of the special specifications, and of the drawings must accompany and form part of the proposals, which must be submitted in duplicate.

4. The right is reserved to waive informalities and to reject any or all bids or parts thereof, or to change the number of tractors to be awarded to any bidder, or to make separate awards on different items, if deemed for the public interest.

5. Bids will be considered only from manufacturers or from factory agents specially delegated to handle United States business. Lack of commercial standing on the part of a bidder, or inadequate facilities or plant on the part of a manufacturer, will constitute good and sufficient grounds for the rejection of bids. All bids received from parties who have failed unjustifiably to fulfill former contracts with the United States will be rejected. Careful investigation will be made of the financial status of individual bondsmen offering themselves as sureties on contractor's bonds, and no bonds of individuals will be accepted until it is conclusively shown to the satisfaction of the contracting officer that such bonds afford ample security to the United States for the fulfillment of the undertaking in question.

6. Payment for all material will be made on delivery on certificates approved by the proper officers of the Ordnance Department and in the manner prescribed by law.

7. Within 10 days after receiving the blank forms the bidder to whom the award is made must execute a contract in quintuplicate, with good and sufficient sureties, for the faithful performance thereof.

8. Contracts will contain the following provisions:

(*a*) The United States reserves the right to order additional supplies under the contract, not to exceed 20 per cent in each case, of the quantities contracted for, at the same prices and to be delivered at the date or dates fixed by the contracting officer, under appropriations made at the date of the contract, or to accept, with consent of the contractor, at the same prices in full satisfaction of the contract, such lesser quantities of the supplies herein contracted for, not less than 80 per cent in each case, as in the opinion of the contracting officer shall best accord with the public interest. The provisions of the contract in regard to liquidated damages will apply to the delivery of any additional orders given under this article.

(*b*) All material furnished under the contract shall be at all times subject to inspection by the proper officers of the Ordnance Department, United States Army; and whatever material furnished which does not in all respects fulfill the requirements of the contract shall be rejected, and the decision of the inspecting officer as to the quantity and quality of the material furnished shall be binding. The contractor will be required to replace all material so rejected.

(*c*) The Chief of Ordnance, United States Army, may make changes in the drawings forming part of the contract, and if such changes involve extra labor and material, a fair price will be paid therefor; but if such changes involve less labor and material, a fair deduction will be made from the contract prices. No claim for addition or deduction on account of such changes will be made unless the same have been ordered in writing. The contractor shall, if requested, furnish promptly a detailed statement of the estimate cost of such changes and the estimated delays caused thereby.

(*d*) In the event of the failure of the contractor to prosecute properly at any time the manufacture of the material herein contracted for, or to complete the delivery at the date or dates stipulated in article 1 of the contract, the Chief of Ordnance, United States Army, may, after notification in writing, proceed at the expense of the contractor to complete the manufacture or delivery of the material contracted for or any part thereof, in such a manner as he may deem best for the interests of the public service, charging to the contractor any excess of cost over the contract price resulting from such action.

(*e*) No person or persons shall be employed in the performance of the contract who are undergoing sentences of imprisonment at hard labor which have been imposed by the courts of the several States, Territories, or municipalities having criminal jurisdiction.

9. No contractor having in hand work of a military character which the War Department may designate as confidential shall permit a foreign officer, or other foreigner not in his employ, to visit portions of the plant where such work is in progress, nor shall he give to such person any specific information concerning such work without the authority of the Chief of Ordnance; nor shall any alien in his employ be engaged on, or be permitted to examine, such parts of the work as the department may specially designate as confidential. The contractor must notify the inspector in charge of the work at his establishment of expected visits in order that the inspector may accompany the foreigner during his visits whenever practicable. A violation of these requirements will constitute sufficient cause for refusal by the department to consider proposals by the contractor for future work of a confidential character.

10. To guard against premature opening and insure their reaching the proper officer, envelopes containing proposals should be marked and addressed as prescribed in the advertisement.

11. *Patents.*—The contractor shall for all time secure to the Government the free and undisputed right to use any and all patented articles used in the work, and shall defend at his own expense any and all suits for infringement of any patent or patents, and in case of adverse claims under patents the contractor shall pay all awards.

SPECIFICATIONS

12. *Design.*—The tractor must be of well-balanced design and the material and workmanship of the highest standard employed in commercial practice. It

must be constructed in the most substantial manner, and all parts of the tractor so designed and constructed as to be readily accessible for adjustment or repair. All parts must be securely fixed. Castellated nuts with cotter pins, or lock washers, must be used on all bolts, the nut and cotter pin being preferred. All grease cups must be securely locked in place and protected, wherever necessary, from damage of any kind.

13. *Strength of parts.*—All parts of tractor, from motor to and including tracks, must be of such size, material, design, and strength as to readily transmit the full power of the motor at the different gear ratios, with a proper factor of safety, with a minimum wear on parts, and with maximum mechanical efficiency. The frame springs and all parts of chassis must have sufficient strength to stand the maximum stresses in the most severe service conditions with a proper factor of safety.

14. *Interchangeability of Parts.*—All parts of tractor must be constructed to definite standard dimensions, with proper tolerances and clearances, so that any part of same may be replaced and properly fitted and adjusted without requiring additional tool work or machine work.

15. *Standard parts.*—It is desired that as many parts of the tractor as practicable be of standard design and constructed to standard dimensions, which will make them interchangeable with the same parts made by other manufacturers. It is also desired that these parts be constructed in accordance with S. A. E. standard where practical.

16. *Materials.*—A complete list of all material used in the construction of the various parts of the tractor must be given, together with the chemical composition and physical properties of same.

17. *Heat Treatment.*—All steel used in the construction of the tractor must be properly heat treated, if such treatment is necessary to develop the best physical properties for the particular purpose for which the material is being used.

18. A complete description of the methods of heat treatment for various purposes and materials must be given, together with a description of the equipment for same.

19. All information in reference to the heat treatment will be considered confidential if so requested by the bidder.

20. *Drawings and Data.*—If requested, each bidder may submit, and each bidder to whom an award is made must submit complete dimensioned detail and assembly drawings, showing size and construction of every part of the tractor. These drawings must show the shop limits on all parts, and a reference number or letter referring to the list of material, physical properties, and heat treatment. The drawings must be arranged in proper order for filing and provided with a suitable index which will enable any individual drawing to be readily located. The drawings and data above referred to will not be opened publicly with the proposal, but will be considered confidential. The drawings and data may be submitted direct to the Chief of Ordnance, Washington, D. C., and should be referred to in each proposal which is submitted. Complete and absolutely accurate list of parts and handbooks will be supplied by each successful bidder without charge. Additional drawings, handbooks, etc., required from time to time must be supplied at cost.

21. *Departure from Specification Requirements.*—In case the tractor on which proposal is submitted does not comply with these specifications in every particular, the bidder must state definitely in what particulars the vehicles which he proposes to furnish do not comply with the specification requirements.

22. Attention is invited to the fact that in the purchase of tractors preference will be given to those vehicles which most nearly comply with all of the requirements of these specifications.

23. The following items are considered of vital importance:

(*a*) Large size engine.
(*b*) Three-speed transmission, with reverse.
(*c*) Maximum ground clearance.
(*d*) Best quality steel springs.
(*e*) Adequate steering clutches.
(*f*) Large radiator.

24. *Guaranty.*—Each bidder will be required to guarantee his vehicle or vehicles against defects in material or workmanship for a period of one year. This guaranty shall include the delivery of the replacement part or parts to any point in the United States. After the installation of the new part, the defective part will be returned to the manufacturer if he so requests. The manufacturer will pay the transportation charges on all returned parts.

25. The above guaranty shall also apply to all parts and accessories which are not made by the bidder.

26. *Tests.*—The department may call upon the manufacturers of tractors for such tests as it may consider necessary to procure tractors that will fully withstand in all respects the severity of military service. Bidders and prospective bidders should write the office of the Ordnance Department of the Army with a view to determining the extent to which practical tests will be applied. In general, tractors for artillery purposes must have proven entirely satisfactory both in preliminary tests of a single tractor by the Ordnance Department, and in more extensive service of a number of tractors in the hands of troops before being approved as satisfactory for military service.

27. The tractors supplied shall be of a general type of the 55 hp. Holt caterpillar, known as model 55-2, developed especially for artillery work or its equal. The tractor will be required to haul artillery vehicles both on and off the road, and over rough and soft ground where there are no roads, and the grades at times about 15 per cent. The loads will vary from 8000 to 19,000 lb. In order to meet all conditions the engine must develop 55 brake horsepower and of this approximately 40 hp. must be delivered at the drawbar after deducting the power necessary to move the tractor on a level dirt road. A drawbar pull of 7000 lb. at 1½ miles per hour will be required.

28. The tractor shall be of the caterpillar or track-laying type, and should not weigh over 18,000 lb. The weight of the tractor shall be carried entirely on the track, and the movement of the tractor controlled through these tracks without the use of any wheels.

29. *Road Speed.*—Three actual running forward speeds are desired of approximately 1¼ to 1½ miles per hour on first speed; approximately 3 miles per hour on second speed; approximately 4½ miles per hour on third speed, and approximately 1 to 1¼ miles per hour on reverse. These vehicle speeds are to be developed at the standard governed engine speed. The direct through drive in transmission shall occur on the second speed. The gear reduction on the first speed ahead must be low enough to slip the tracks of the tractor under all ordinary conditions.

30. *Type of Drive.*—The tractor may be provided with a suitable standard type of drive either spur-gear, bevel-gear or worm gear. Preference will be given to that type of final drive that provides the greatest amount of ground clearance in conjunction with provision for retaining grease or oil and excluding dirt.

31. *Ground Clearance.*—A maximum amount of ground clearance is desired, and this should not be less than 15 in., and preferably 18 in.

32. *Track Construction and Drive Gear.*—The drive from the cross shaft to the track shall be of simple and strong construction, adapted to resist wear and the effect of dirt. The weight of the tractor shall be spring supported on a truck or roller system, and the track laid for this system must be smooth and rugged. The shoe, track sprocket and rails shall be of a design and material to resist wear for the longest possible time under ordinary uses. The width of the shoes shall be not less than 12 in. and not greater than 15 in.; the average ground pressure shall not be greater than 6½ lb. per square inch. Means shall be provided for adjustment of the track to compensate for wear, or for other purposes. The tracks shall be approximately 61½ in. from center to center. Track lubrication shall be provided and the oil capacity for this purpose shall be sufficient for a run of 60 miles. If continuous lubrication is provided, means must be provided for shutting off this oil supply when the tractor is not running. Bearings, wherever practicable, must be protected from dirt in a thorough manner, and adequately lubricated. The tractors will be used at times over macadam and asphalt roads, and for the protection of the roads, as well as to eliminate tractor vibration, supplementary yielding shoes are desired. These supplementary shoes, if specified, will be provided at an increased price. Grousers or grips for increasing traction must be provided in a standard equipment. These grousers must be arranged to be quickly and easily applied or removed with some form of reliable and quick device. Track

rollers and driving sprockets must be mounted on anti-friction bearings. The design and arrangement of the track must be such as to produce fairly quiet action.

33. *Track Length.*—Length of the track in contact with the ground when the track is sunk into the ground not over 3 in. below the level ground surface shall be from 75 in. to 85 in.

34. The engine must be of a four-cycle type, water cooled, having not less than four cylinders and provided with mechanically operated poppet valves. It must develop a maximum horsepower of not less than 55 at a piston speed of 800 ft. per minute. All crankshaft and connecting rods and lower connecting rod bearings shall be so designed as to be easily adjustable to take up wear. The piston-pin bearing shall consist of a suitable phosphor-bronze bushing properly secured in the connecting rod lower end. The valve stem guides and push rod guides shall not be cast integral with the cylinder casting, but must be separate parts properly secured in place. The unit power plant type of construction will not be permitted, and the transmission must be mounted as a separate unit.

35. *Cylinders.*—The cylinders shall be cast from best quality gray iron, and must be free from sandholes, blowholes, coldshuts or other imperfections. The bore of the finished cylinder must be finished to a tolerance of plus or minus 0.001 in. for diameter and eccentricity.

36. The water-jackets of cylinders must be tested under a hydrostatic pressure of 100 lb. per square inch, which test they must withstand without leaking.

37. The cylinders must be rigidly attached to the crank-case by means of studs located in the crank-case and single long type of tight fitting nuts at the top. The diameter of the holes in the cylinders must not be more than 1/32 of an inch greater than the diameter of the studs.

38. The water passage in jackets shall be of large area and volume, must extend entirely around the valve seats and must offer as little obstruction as practicable to the flow of water. The water passage will be so designed as to secure a uniform flow of water through all parts of the jacket. The water must circulate freely between the cylinders, and the jackets must be free from air pockets, or dead ends, where the water is unable to circulate freely. The jacket space must be so designed that all water will drain completely from the jackets when the lower drain-cock on radiator or water-circulating system is opened. The tractor must be capable of negotiating long distances of poor road at a speed not exceeding 1½ miles per hour without boiling.

39. The compression space in each cylinder must be accurately calibrated and the cylinders selected so that the clearance volume of each cylinder is the same as that of any other for the same engine within 1 cu. in.

40. *Pistons.*—The pistons shall be designed and constructed in accordance with the best standard practice. They shall be light in weight, heavily ribbed, to secure proper strength and made of the best quality gray iron, free from blow holes, sand holes, shifted cores or other imperfections. They shall be properly annealed, machined with light cuts to avoid distortion and ground to a high finish, proper tolerance and a suitable clearance in cylinders.

41. The clearance between the maximum diameter of piston and the diameter of cylinder bore shall not be less than 0.0006 nor more than 0.0012 in. per inch in piston diameter. The piston shall be properly tapered or relieved at the head end to provide for expansion, and shall have an internal stiffening flange at the open end.

42. Suitable means must be provided for preventing an excess of oil from working past the piston rings and into the combustion space, and at the same time securing proper lubrication of the piston and all bearings connected with the crank case.

43. The pistons shall be of such length as to give a low bearing pressure on the cylinder walls. The pistons must also be so designed and constructed as to avoid slapping at all loads and governed engine speeds.

44. The piston complete with rings and piston pins must be selected for weight, so that each piston will be the same in weight as any other piston for the same engine, with a tolerance of plus or minus 1 ounce.

45. *Piston Pins.*—The piston pins shall be hollow, with a wall of proper thickness. They shall be made of steel of suitable quality for the purpose, properly hardened, and ground to a high finish and proper tolerance. The hardness of the piston pins shall be between 75 and 90 as indicated by the Shore scleroscope.

46. The piston pins shall be a light driving fit in both of the piston bosses. The piston pin shall be fastened only in one piston boss, and the fastening must be made by an approved device, which will positively lock the piston pin in the piston boss, and prevent it from coming loose.

47. *Piston Ring and Grooves.*—The piston shall be provided with at least three ring grooves of proper width and depth, all located between the wrist pin and the head end of piston.

48. If the triple type of ring is used, having one internal ring and two external rings, two ring grooves may be used, each provided with triple ring.

49. *Valves.*—The intake valves and exhaust valves must be interchangeable.

50. The valves must be ground to a thoroughly gas-tight fit in the valve seat.

51. The valves must have a large radius fillet between the stem and head.

52. *Valve Timing.*—The flywheel of engine must be provided with marks, referred to a readily observable pointer or reference mark, showing the upper-dead-center, and the opening and closing position of both inlet and exhaust valves, for each cylinder.

53. *Valve-stem Guides.*—The engine shall also be provided with suitable pressed-in or bolted-in valve-stem guides. The use of valve-stem guides cast integral with the cylinders will not be permitted.

54. *Valve Springs.*—The springs for both intake and exhaust valves shall be made of best quality steel, of proper strength for the maximum speed of the engine, and designed so as to withstand a long period of service without sagging or breaking. These springs shall be heat treated to develop the proper physical properties.

55. *Valve Lifter.*—The valve lifter must be made of the most suitable material and of proper design, with glass-hard working surfaces (not less than 90 scleroscope). It must have a suitable adjustment device which is easily accessible and which will retain the adjustment and not shake loose. This adjusting device must be strong enough to withstand heavy strains with a wrench in adjusting without distorting or stripping of threads.

56. *Connecting Rods.*—The connecting rods shall be of I-beam section, drop forged from steel equal to S. A. E. steel No. 1036 and properly heat treated.

57. *Valve-lifter Guides.*—The engine shall be provided with suitable valve-lifter guides of proper material, which will be either bolted or pressed into the crank case. The use of valve-lifter guide cast integral with the crank case or cylinders will not be permitted.

58. The crank end of the connecting rods shall be provided with removable bushings faced with a proper thickness of best quality bearing metal.

59. These bearings shall be scraped or reamed to a proper fit with the crank and in proper alignment at all positions of the cranks. The bearing shall be provided with proper grooves and oil holes for lubrication.

60. The bearing on pin piston shall be in the connecting rod end, and a suitable solid phosphor-bronze bushing, pressed in, shall be used.

61. The bearing at each end of connecting rod shall be large enough to withstand long periods of severe service without the necessity of replacement or adjustment.

62. The cap end of connecting rod shall be made of the same material as the connecting rod and shall be held to the rod and bearings by means of suitable bolts made of best quality alloy steel equal to S. A. E. specification No. 2330 or 3130, properly heat treated to give an elastic limit of 80,000 lbs. per square inch minimum, reduction of area 55 per cent minimum, and elongation 18 per cent in 2 in. minimum. These bolts shall be provided with suitable castle nuts and cotter pins.

63. The complete connecting rods for each engine must be selected for weight, so that each connecting rod shall be of the same weight as that of any other connecting rod for the same engine, with a tolerance of plus or minus one ounce. The crank ends of connecting rods, and also the piston pin ends, must weigh the same within a tolerance of plus or minus one-half ounce.

(To be continued.)

46 Tractor Makers at Fremont

Practically All Big Manufacturing Interests Represented—Automobile Industry's Influence Apparent—Lack of Organization Impairs Importance of Tests—S. A. E. Tractor Session to Be Greatest Ever Held

By A. Ludlow Clayden

FREMONT, Neb., Aug. 7—Special to THE AUTOMOBILE AND AUTOMOTIVE INDUSTRIES.—The annual national tractor demonstrations opened here yesterday, with forty-six different makes of tractors ready to start plowing the 3000 acres of land 2 miles outside this city, which the tractor committee had set aside for work. These forty-six makers represent practically all of the big manufacturing interests, including all of the old-line makers as well as many new makes that have come into production within the last year. Considerable disappointment is expressed by the old tractor makers that more of the automobile concerns which are known to have developed new types are not represented here.

Automobile Industry Represented

The automobile industry was to-day better represented than ever, as three special cars arrived bringing a large quota of accessories and parts makers, headed by Alfred P. Sloan, Jr., president of the United Motors Corp., and including Howard E. Coffin of the Council of National Defense and R. D. Chapin, Hudson; R. H. Collins, Cadillac; H. B. Jewett, Paige; C. F. Kettering, Delco; C. W. Nash, Jeffery; J. W. Bates, Mitchell; and a dozen others. The heavy rains of yesterday delayed plowing to-day, and it will be another day before the demonstrations will be under way.

Ford, who was expected to be here, will not demonstrate his new tractor, the reason being the demand for production of Ford machines that are being made for the British government. Many expected that the General Motors tractor, which was demonstrated some time ago to the Government, would be here, but it is not. There are several other machines being developed by automobile makers who were expected but have not materialized. On the other hand, there are some new machines coming as products of the automobile industry. Notable among them is the Cleveland tractor, the design of Rollin White; the Velie developed by Otto Szerely of the Velie company; the Fageol built by the Fageol company of Oakland; and the Four-Drive. All these represent automobile knowledge and experience applied to the tractor problem and the influence the automobile is exerting on the tractor industry is noticeable. Ninety per cent of the machines, by the more general adoption of the automobile type of engine, and by proper inclosure of transmission gears, together with a simplification of control, show the results of automobile experience.

More Three and Four-Plow Types

Compared with machines participating in the demonstrations last year, it is easy to see that makers are concentrating on those types pulling three or four plows. There are fewer of the big machines that pull ten, twelve, or more plows, and there are also fewer of the cheap types of a year ago, namely, machines with single-cylinder engines and generally cheap construction. The demonstrations center around a veritable tent city situated amid the level cornfields outside of the city. At a distance the scene resembles a large military encampment. Approaching this tent city, you discover that each of the forty-six competitors has a large tent of his own, under which are housed from one to a dozen tractors, together with all of the tables, chairs, and other furniture that crowd automobile exhibits at a New York or Chicago show. Here the engineering and sales forces hold forth when the plowing is not taking place.

In two or three overflow tents are a score or more of parts and accessories firms, such as makers of engines, carbureters, bearings, ignition apparatus, lubricants, piston rings, and the varied other lines of tractor parts.

The demonstrations are too large for the system controlling them, and even the show is too big for the method of arranging the exhibits; it lacks organization in both big and little things. For example, many of the tents are so poorly provided with signs that they are lost, and it is hard to find any particular exhibit. There is a distinct center, but after that the rest straggles, and a visitor is not easily sure when he has made the complete tour. Still, this is not so bad as the lack of organized demonstrating. As things are, there are 3000 acres of land to be plowed, open at certain hours. Any one goes out when he likes, and does what he likes.

Valuable Records Neglected

For every tractor claims are made as to capacity, speed of work, fuel consumption, etc., but none of these things is shown by the sort of plowing being done. Certainly one thing has been accomplished, which is that the tractors which advertise to run on kerosene have had their tanks sealed and samples of the fuel taken, so that there can be no suspicion of doubt on this all-important point, but there is need for putting the machines to work under observation, so that the accomplishment of one could be compared, at least to some degree, with that of another.

Demonstrations, as they are being held, have an effect that spreads over little more than the immediate vicinity of Fremont. Demonstrations, as they might and should be organized, would cover the continents of America and Europe too.

Never before has there been such a gathering of automotive engineers at a tractor meeting. Many leading members of the S. A. E. are here, many representatives of automobile and truck concerns, and many from the accessory field. The discussion on tractor service, to be held on Thursday night, will be the most important gathering of tractor men of to-day and of to-morrow that has ever taken place. For the dinner on Wednesday over 300 tickets have been sold, and the talks and discussion on kerosene which follow it are expected to vie in interest with the service-problem discussion.

Remy Tractor Embodies New Principle

Three-Wheel Design Drives and Steers by Power Through Rear Wheels, Using Ingenious Differential —Front Wheel Is Caster Only — Ready in Fall

EARLY next fall the first set of agricultural tractors will be placed in service by the recently organized Remy Bros. Co., Kokomo, Ind. An experimental machine has been completed for some time. This has been subjected to a variety of tests, as a result of which several minor changes in design have been made, and the first lot of machines is now in production.

The Remy tractor introduces an entirely new feature in tractor design—that of both driving and steering with the two rear wheels. To realize the advantages of this principle it is well to point out some of the difficulties generally met with in tractor work. When the ground is wet and soggy, as it often is in spring plowing, it is difficult to get proper traction unless a large percentage of the tractor weight is carried by the driving wheels. This expedient, however, leaves only comparatively little weight on the front wheels, and as the torque reaction of the rear wheels tends to lift the front end of the tractor from the ground, there often remains insufficient weight on the front wheels to insure positive steering. This might be remedied by placing the weight of the engine well forward, but by doing so we run up against the old difficulty of insufficient traction under unfavorable conditions of ground.

Weight Distribution Well Balanced

Remy Bros. have solved the problem by combining the steering and driving functions in the rear wheels, which enables them to place the weight to the best advantage both as regards positive steering and the maximum traction. In doing so they have not resorted to the old expedient of pivoting the driving wheels and transmitting power to them through universal joints in the steering pivot axis, which would have meant complication intolerable in an agricultural tractor; on the contrary they employ an unbroken dead or stationary axle, but they have introduced an engine-operated differential mechanism whereby one of the driving wheels is compelled to turn either faster or slower than the other, and may be even rotated in the reverse direction. There are three wheels in all on the tractor, but the front wheel is merely a caster and allows the front end of the tractor to swing in either direction, as determined by the relative motion of the rear wheels.

A stock engine of the tractor or heavy duty type is used, and drives through a friction clutch and a special two-speed-and-reverse gearset to a propeller shaft. Neither of the two forward speeds of the gearset is a direct drive, advantage being taken of this gearing to obtain part of the comparatively large reduction required between the engine crankshaft and the driving wheels. The whole train of transmission gearing is so laid out as to give a plowing speed of substantially 2½ m.p.h. and a road speed of twice this. The reverse gear reduction is about the same as the gear reduction for the plowing speed. These reductions are obtained in three steps—the transmission gear set, the jackshaft bevel gear set and the driving wheel gears.

Operation of the Transmission

The propeller shaft enters the jackshaft housing and drives the differential jackshaft through a pair of bevel gears at a reduction of 3 to 1. Back of the jackshaft and within the same housing is located a second differential shaft. As shown in the more or less diagrammatic sketch herewith, one drive shaft of the countershaft is geared by spur wheels to one side shaft of the steering differential in the ratio of 1 to 1 and the other drive shaft of the countershaft is geared by spur wheels to the frame of the steering differential in the ratio of 1 to 2. The result is that the frame of the steering differential turns in a certain direction at a given speed and one side gear of this differential turns in the same direction at twice this speed, with the final result that the other side gear of the steering differential, which side gear carries a worm gear on its shaft, is ordinarily stationary. This last mentioned side gear can, however, be turned in one direction or the other by means of a friction cone drive, taken from the forward end of the engine, and by means of a transmission mechanism comprising a shaft running lengthwise of the tractor, with a worm gear set at either end. Through the medium of a wheel which the driver holds in his hand, one or the other of a pair of cast-iron cone wheels can be shifted into engagement with a cone wheel on the forward end of the engine crankshaft and the side gear of the steering differential carrying the worm wheel can thus be turned in one direction or the other. When this side gear is stationary, that is, when both friction cones are out of engagement with the driving cone, the tractor travels straight ahead; when the side gear turns in one direction, one tractor wheel will turn faster than the other and the tractor will swing around. The steering mechanism is so laid out that when the steering hand wheel is turned to the right the tractor swings to the right, and vice versa; hence the control is uniform with that on other tractors and only the effect on the tractor is different. Among the features resulting from this arrangement of the steering mechanism is that the tractor may be swung around without moving forward, while the clutch is being held out or the gears are disengaged, so that it turns on its own base.

Power Plant of Conventional Design

No new features are claimed for the power plant. As stated, a 30-hp. tractor type stock engine is used, with stock carbureter, high-tension magneto ignition and cooling by means of a tractor or truck type radiator with cast top and bottom tanks and a flanged-tubular core. Circulation is by centrifugal pump. The power plant is supported on the channel steel frame at three points—the single front support being of the swiveling type on a crossmember and the rear supports on brackets secured to the frame, on which the legs of the engine rest. Back of the engine is a dashboard, on which the ignition switch is mounted, and the engine is covered by a hood resting on ledges on the radiator and dash. The main frame is made of 6-in. channels. These are notched

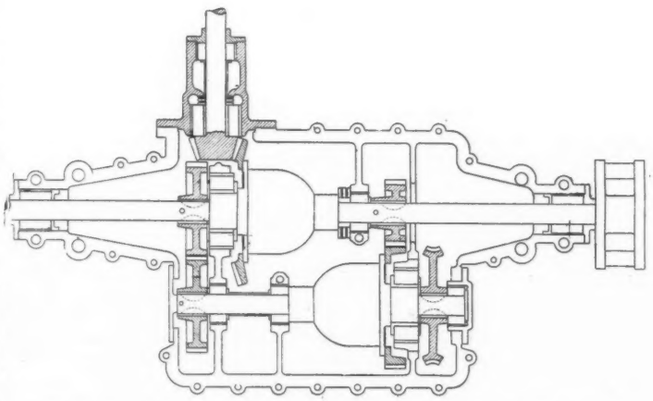


Diagram of Remy jackshaft drive and steering differential, showing engine-driven worm wheel on steering differential

on top at the point where the rear axle comes. The latter is of circular section, 2⅝ in. in diameter and carried in spring-hung bearings. Placed on top of the 6-in. channels and extending from a point about 7 in. in front of the rear axle is a 5-in. channel. This serves a triple object in that it overcomes the weakening effect due to the slot for the axle in the main frame channel, builds up the frame to a height above the level of the transmission mechanism, so plane floorboards may be put on, and permits of the jackshaft being fully assembled before being placed on the tractor. There is one crossmember of the frame at the rear end, and two diagonal crossbraces are provided to stiffen the frame against the weaving action resulting when one wheel turns forward and the other backward in steering.

The driving wheels are 56 in. in diameter with a rim 10 in. wide. They are of the standard tractor type with radial steel spokes, a rolled rim into which the spokes are riveted and a cast-iron hub into which the spokes are cast. The cast-iron hub is bored out to run directly on the axle and is provided with a grease cup between the two circles of spokes. The driving gears are of the internal type; they are piloted on the road wheel hubs and connected to the rims by three chordal driving straps. The pinion meshing with the internal gear is of the lantern wheel or pin wheel type, containing a number of round pins or rods extending parallel with its axis between two radial flanges. Fenders completely cover the top halves of both the rear wheels and their driving gears, so as to keep down the dust as much as possible. A contracting brake acts on a drum on the propeller shaft directly back of the gearset, and is operated by the same pedal as the clutch, the first motion of this pedal releasing the clutch and continued motion applying the brake. A spring mounted seat for the operator is so located that the latter has all the control members within convenient reach. The front wheel, or caster wheel, is 36 by 6 in. The fork in which this wheel is mounted is swiveled to the frame but no steering linkage is fastened to it. Owing to the fact that the wheel axis is considerably offset from the swivel axis this wheel always trails and does not interfere with swinging around the front end for steering purposes.

One incidental advantage of the Remy construction which may be of considerable importance in some applications other than plowing is that the tractor is power-steered. The operator only engages the steering mechanism with the engine and the latter then furnishes the power required to swing the tractor around. This evidently makes the work of tractor operations less tiring. The tractor is also claimed to produce more drawbar pull than the ordinary type, owing to the fact that a larger proportion of the weight can be placed over the driving axle.

Lighting Generator for Army Trucks

FOR use on any army trucks and high-grade commercial vehicles an automatic lighting generator has been developed by the Westinghouse Electric & Manufacturing Co. and placed in manufacture at its Shadyside Works at Pittsburgh. It has been designed to meet all the requirements of the Government specifications for army equipment as approved by the quartermaster general in May, 1917.

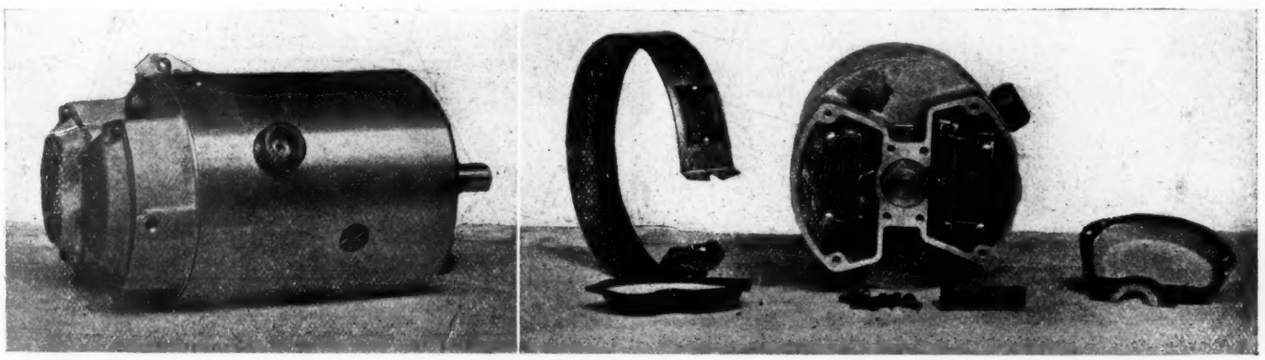
In appearance the generators are similar to other machines of the Westinghouse line of generators and motors for automobile work. The frame is made from steel pipe whose circular section lends itself to cradle mounting on the engine. The end brackets may be extended to form flanges for end mounting, in which case cradle brackets are not required.

Large size ball bearings are used for the coupled type. Where generators are mounted on the gear cases by supporting flanges large bronze sleeve bearings are employed, lubricated by a continuous stream of oil. Windings are mechanically and electrically strengthened by a double impregnating treatment which makes them both oil and waterproof. Field coils are securely located on poles and highly insulated from ground. Four brushes are supplied in place of the customary two. Only one wire is required to connect the generator to the car's wiring system. The result is a compact, rugged, accessible, simple unit, thoroughly adapted for hard service.

The cutout switch and the voltage regulator are mounted within the bracket on the commutator end; removable covers provide access to both. The cutout is adjusted to close the circuit to the battery when the speed of the generator has reached such a point as to give 6.5 volts at the generator terminals; it opens with a reverse current of one ampere, and at a speed below the cut-in speed, to avoid any tendency to chatter when the generator is running near the cut-in speed. The cut-in speed varies from 5 to 10 m.p.h., depending on the gear ratio and wheel diameter used on the car.

The regulator has been especially developed for truck work. Movement of one of the contacts of the regulator is caused by a cam on the generator shaft so that this operation is absolutely positive, and contacts are either in intimate contact or entirely open. A slight wiping motion keeps the contact surfaces clean. Regulation is effected by opening and closing the regulator contacts, thus cutting in and out a resistance connected across these contacts and in series with the field winding of the generator; the time the contacts are closed varies with the speed. The generator will maintain a proper voltage and current output even though the battery becomes disconnected. An opening in the end bracket is provided for access to the regulator adjusting screw.

The machines are ordinarily adjusted at the factory to give a voltage not greater than 8 volts at 1 amp. output at speeds up to 2000 r.p.m. and with a load of 15 amp. to give a voltage of not less than 7 volts up to 2000 r.p.m. The generator is capable of giving a continuous output of 12 amp. at 7.5 volts, and the range of possible adjustment of regulator makes it also applicable to some of the higher class passenger or utility vehicles as well as military trucks.



Left—New Westinghouse army truck generator. Right—Showing covers removed, exposing voltage regulator and cut-out switch

Finding the Center of Gravity

A Simple Experiment in Physics Applied to an Automobile with a Platform Scale as a Laboratory

By C. W. Smith

IT is an elementary demonstration in beginning physics to take a flat object, the thickness of which can be neglected, and suspend it from two different points, each time hanging a plumb line from the point of support and marking behind it upon the object. The two lines, thus made, crossing the object will intersect at its center of gravity.

But when one wishes to find the center of gravity of a more complicated object the problem is not so simple. The following method, although worked out to apply specifically to an automobile, would apply to almost any object.

To determine the center of gravity of an automobile when the car is on level ground, assuming that the center of gravity is in the plane midway between the wheels, proceed as follows:

Let A, Fig. 1, be the fulcrum. Put a platform scale under B and call the weight recorded on the scale F_1. Call the entire weight of the car W.

Then $Wd = F_1 (2d)$

$$W = 2F_1 \qquad (1)$$

(F_1 is the sum of the weights of both hind wheel and front wheel on the one side.)

Then tip the car as shown in Fig. 2.

Let F_2 = weight recorded by scale under B when machine is in this position.

Then $Wx = F_2 y$ (2)

But $y = 2d \cos \phi$

But $x = AC \cos (\theta + \phi) \qquad AC = d \sec \theta$

$= d \sec \theta \cos (\theta + \phi)$

$= d \sec \theta (\cos \theta \cos \phi - \sin \theta \sin \phi)$

$= d \cos \phi - d \tan \theta \sin \phi$

$= d (\cos \phi - \tan \theta \sin \phi)$

Equation (2) ÷ (1)

$$\frac{Wx}{W} = \frac{F_2 y}{2F_1}$$

$$d (\cos \phi - \tan \theta \sin \phi) = 2d \cos \phi \frac{F_2}{2F_1}$$

Dividing through by the $\cos \phi$

$$1 - \tan \theta \tan \phi = \frac{F_2}{F_1}$$

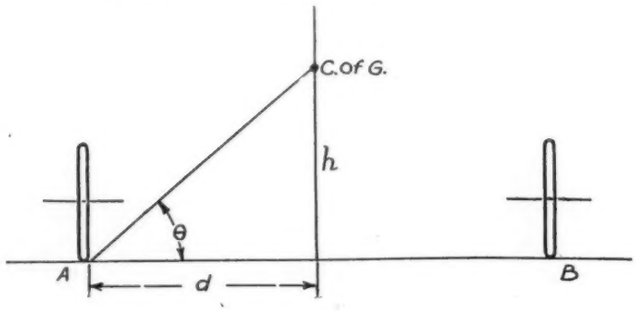
$$\tan \theta = \frac{1 - \frac{F_2}{F_1}}{\tan \phi}$$

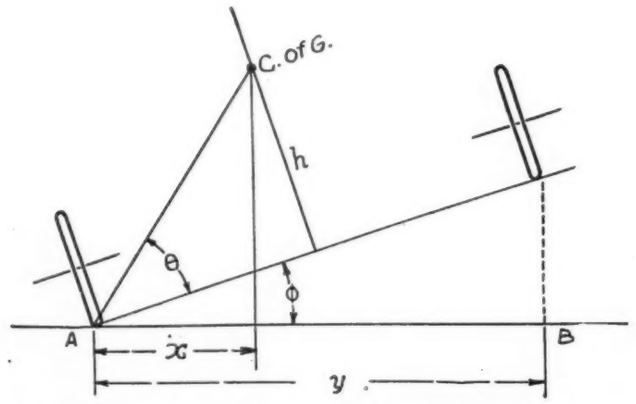
$$h = d \tan \theta = d \left(\frac{1 - \frac{F_2}{F_1}}{\tan \phi} \right) = d \left(\frac{\frac{F_1 - F_2}{F_1}}{\tan \phi} \right)$$

$$= \frac{D (F_1 - F_2)}{2F_1 \tan \phi} = \frac{D (F_1 - F_2)}{W \tan \phi}$$

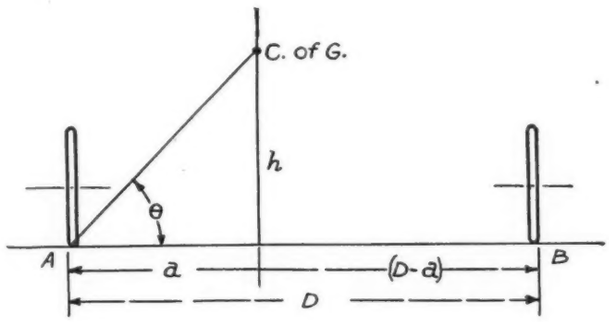
Where D is the wheelbase or $2d$, and F_1 will be half the weight of car. F_2 and F_1 can be determined by scales. Tan ϕ is tan of the angle through which the car is tipped; d is one-half the width of the car. All of these values can be determined experimentally and therefore h or the height of the center of gravity can be obtained.

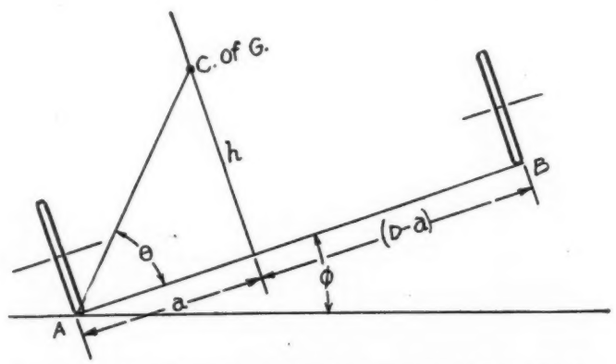
To determine the center of gravity of a car, assuming





Above—Fig. 1, automobile on level, assuming that center of gravity is in the plane midway between the wheels
Below—Fig. 2, automobile tipped, assuming that center of gravity is in plane midway between the wheels





Above—Fig. 3, automobile on level when center of gravity is not in plane midway between the wheels
Below—Fig. 4, automobile tipped when center of gravity is not in plane midway between the wheels

that the center of gravity is not in the plane midway between the wheels and at right angles to the axle.

On the level, shown in Fig 3:

Let W represent weight of car
Let F_1 represent weight on scale at B
$F_1D = Wa$

$$F_1 = \frac{Wa}{D}$$

With the car tipped, as in Fig. 4:

Let W represent weight of car
Let F_2 represent weight on scale at B
$F_2D \cos \phi = Wa \sec \theta \cos (\theta + \phi)$
$F_2D \cos \phi = Wa \sec \theta (\cos \theta \cos \phi - \sin \theta \sin \phi)$
$F_2D \cos \phi = Wa (\cos \phi - \tan \theta \sin \phi)$

$$F_2 = \frac{Wa}{D} (1 - \tan \theta \tan \phi)$$

$$\frac{F_2}{F_1} = 1 - \tan \theta \tan \phi$$

$$\tan \theta = \frac{\frac{F_2}{F_1} - 1}{-\tan \phi}$$

$$\tan \theta = \frac{1 - \frac{F_2}{F_1}}{\tan \phi}$$

$$h = a \tan \theta = a \left(\frac{1 - \frac{F_2}{F_1}}{\tan \phi} \right)$$

$$Wa = F_1D$$

$$a = \frac{F_1D}{W}$$

$$h = \frac{F_1D}{W} \left(\frac{1 - \frac{F_2}{F_1}}{\tan \phi} \right)$$

$$h = \frac{F_1D}{W} \times \frac{F_1 - F_2}{F_1} \times \frac{1}{\tan \phi} = \frac{D (F_1 - F_2)}{W \tan \phi}$$

Therefore h can be determined because all values in this expression can be obtained experimentally.

D = width of car.
F_1 = weight on scale when car is level.
F_2 = weight on scale when car is tipped.
W = weight of car.
$\tan \phi$ = tan of the angle through which the car was tipped.

It is interesting to note that the same expression is reached for h, whether the center of gravity is considered in the plane midway between the wheels or not.

—

Oakite Plater's Cleaner

THE Oakley Chemical Co. of New York manufactures a preparation for cleaning metal parts for plating. It is known as Oakite plater's cleaner and is claimed to reduce operating costs, to shorten the time required for cleaning, to insure a chemically clean base metal and to provide better working conditions and eliminate danger to the workmen. Oakite plater's cleaner is a combination of salts, which emulsifies oils and greases, thus destroying their adhesive nature. This is a purely physical action, as distinguished from the chemical action of the usual alkali cleaners. These latter saponify oils and greases, combining with them, with the result that the cleaners are rapidly used up. Only a small amount of Oakite is necessary to emulsify a large amount of oil or grease.

Before making up a tank of the plater's cleaner, the tank should be thoroughly cleaned. It should be heated with a steam coil, rather than with live steam, as continual dilution of the solution due to condensation is wasteful. The steam coil should be placed on the side of the tank—that side from which the work is withdrawn—rather than on the bottom. The tank must be provided with a bottom drain. Cleaning solution should always be used at the proper temperature and must be boiled for 1 hour after being first made up. The density of the solution depends upon the nature of the parts to be cleaned. For cleaning brass, copper, bronze and German silver parts, a solution made up of 6 ounces of Oakite plater's cleaner to 1 gal. of water is used; it is boiled for 1 hour before using and is then maintained at a temperature of 180-200 deg. Fahr. The parts are swashed in the solution until they are clean and are then rinsed in cold running water. If necessary, they may be immersed in a 10 per cent solution of sulphuric and muriatic acid and again rinsed in cold water, after which they are ready to be placed in the plating bath. For cleaning iron and steel parts and iron castings, a solution made up of 8 ounces of Oakite cleaner to a gallon of water is used. The solution is boiled for 1 hour before using and is maintained at the boiling temperature while being used. The parts are swashed in the solution until clean and are then rinsed in cold water. An acid dip may be given the parts if necessary, which must also be followed by rinsing in cold water.

No Chemical Action

In general use of the cleaning tanks about one-sixth of the quantity of the material originally used for making up must be added each week. As there is no chemical action, a tank need not be dumped until the solution is excessively weakened by loss of cleaner carried out on the work or until the action is greatly retarded by the accumulation of oil and dirt.

Where two tanks are available for cleaning it is well to first use another cleaner to remove the greater part of the substances not desired on the work, thereby reducing the time, labor and expense of cleaning. For removing tripoli a solution may be made up of 5 ounces of Oakite composition No. 1 to a gallon of water, to which 4 ounces of sal ammoniac are added daily for each 50 gal. of solution. This solution must be maintained at a temperature of 200 deg. Fahr. The work is swashed in the solution, is brushed, if necessary, and is then rinsed in either cold or hot water, after which it is ready for the plater's cleaner tank.

Sand buffing mixture may be removed by means of a solution made up of 5 ounces of Oakite composition No. 2 to 1 gal. of water, to which 4 ounces of sal ammoniac are added daily for each 50 gal. of cleaning solution. The method of handling the parts is the same as described above.

The use of an electric cleaner with Oakite plater's cleaner gives a chemically clean surface in a shorter time than is obtained with a still bath and diminishes tarnish and corrosion on tender work. The solution should be made up with 4 to 6 ounces of Oakite plater's cleaner to each gallon of water. It is then boiled for 1 hour. While being used it is maintained at a temperature of at least 200 deg. Fahr. A current of about 6 volts is applied, with the current density of about 50 amperes per square foot. The cleaner makes an electrolite of high conductivity, which permits of ready passage of the current. On difficult work it is sometimes well to use a double throw switch, so that the current can be sent through the bath for a short time in one direction, then reversed for a few moments and then reversed again and allowed to flow in the original direction until the process is completed. The iron tank may be used as the anode, with the regular insulated frame and rod on the top to suspend the work from. It is better practice, however, to use a sheet iron anode about 6 in. square. The use of Oakite plater's cleaner in an electric cleaner is particularly advantageous for cleaning soft metals, as it diminishes tarnish and pitting.

Oakite cleaners are also largely used in the manufacture of munitions.

Steels Used in Airplane Work—IV*

Manganese Steel Cannot Be Machined—Properties of Nickel, Magnet and Sheet Steels—Welding, Tube Possibilities and Cast Iron—Forging and Stamping

By Dr. W. H. Hatfield

MUCH research work has been done on manganese steel, and it is important that, whereas tempering softens ordinary carbon and alloy steels, if a sample in the condition just referred to (quenched from 950 deg. C.) be tempered, it actually becomes progressively harder and magnetic. After such treatment the great toughness and non-magnetic properties can only be restored by a further quenching from a suitable temperature. (The mechanical properties of manganese steel sheet are indicated in Table II.)

To assist the engineer in avoiding needless worry, it would perhaps be well to point out that commercially this manganese steel cannot be machined (although in sheet form it is easily punched and sheared). The best way of dealing with it, if it is to be used, is to forge to shape, water toughen, and then finish by grinding. Its uses need not be more fully discussed here, but it is considered that the material is of sufficient importance to have required some general indication as to its properties and structures. The remarks will, at any rate, not have failed to indicate that some of the different steels are quite as unlike as different metals.

25 Per Cent Nickel Steel

It is, on the face of it, a curious fact that two magnetic materials such as iron and nickel should, when alloyed in certain proportions, produce a non-magnetic alloy. A steel containing 25 per cent nickel has this and other valuable properties. As previously pointed out, some elements lower the magnetic and carbon change-points in iron, and this particular percentage of nickel lowers them to something approximating to —40 deg. C. The result is that if the material does not reach temperatures much below normal ones, this steel remains in a non-magnetic condition. It should, however, be pointed out that the nickel must be reasonably near 25 per cent, say within a range of 24.5-27.5 per cent, for satisfactory results, with the carbon in the vicinity of 0.30 per cent. The manganese should also be kept low. Microscopically, such steel will, when put in its best condition, consist of polygonal grains or allotrimorphic crystals of solid solution of carbide of iron and nickel in iron containing nickel. The mechanical properties of this steel are of similar order to the manganese steels (Table III), the distinctive feature being the low elastic limit and a slightly lower modulus of elasticity.

With regard to this steel, our experience has been that a little chromium has several advantages. In the first place, it seems to improve the machining properties without deteriorating the non-magnetic properties, and incidentally assists in preventing any precipitation of the carbon in the free condition.

These high-nickel steels, particularly when they contain percentages from 27-32, are claimed to be rustless, and are used considerably for valves, boiler tubes, etc. This rustless property tends, however, to be somewhat fugitive, and such steel is apparently losing favor in that direction, especially in view of the introduction of the high-chromium "stainless" steel. A good deal of research work in this field will lead to a more complete understanding of its properties.

Magnet Steel

The production of good magnets has been, and is, quite an important question, and a few remarks may, therefore, be in place. The analyses of numerous makes of magnets, British and non-British, indicate that there seems to be a fair unanimity of opinion with regard to composition, and it would appear that a steel containing 5-6 per cent of tungsten is favored with a carbon content of 0.60-0.80 per cent.

The requisite properties for permanent magnets are high remanent magnetism and high coercive force. Both these qualities cannot be raised to the maximum value at the same time, and therefore the first has to be sacrificed to some extent in order to obtain the best value in the second. Coercive force becomes of relatively greater importance the greater the air space included in the "magnetic circuit" and the more severe the conditions become in use. Also vibration and variation of temperature tend to decrease the intensity of magnetization, and the good value of coercive force is necessary to counteract these effects. As just mentioned, special care must be taken during the hardening of magnet steel if it is to be brought into its proper condition. With suitable treatment a 5 per cent tungsten steel should be made to give a coercive force 55-65 c.g.s. units and a remanent flux density of about 10,000 c.g.s. units.

Sheet Steel

A considerable tonnage of sheet steel is employed in aero work, and a few words, therefore, may be in place. The supply of sheet steel possessing definite physical properties has been brought very much to the front of late, and there is admittedly much to be learned both by the maker and user. The present method of manufacturing clips, etc., from such steel is worth looking into. These are usually bent to various complicated designs in the cold state by means of the hammer and vise. In order to stand this rough usage, the steel must be supplied of such properties that it will withstand bending double in any direction over itself; it is quite possible to imagine a man who is bending a clip over to a template bending it too far and then having to bring it back again, possibly more than once, producing extreme local cold work. As to how such a practice may deform the structure locally, micrographs illustrating the remarks on bending tests will indicate. Considerable local strain is put upon the metal. The steel used for such purposes has usually a low tensile strength, say 28-30 tons. A higher class of sheet steel is being used containing nickel which gives approximately 35 tons tensile with a considerably higher yield-point than the mild steel. A drawback against this latter steel is that there is some difficulty in working it. It will be noticed that the structure is a very small one, but that it essentially consists of pearlite and ferrite.

Sheets for Lightness and Strength

As the demand for lightness with strength is such a vital matter, it is quite easy, from the steel manufacturer's point of view, to supply sheets which, when heat-treated, will readily give a tensile of 50 tons, combined with a fairly good elongation, and sheet capable of tensiles up to 100 tons can be supplied, provided that sufficient care be taken by the aeroplane builders to treat this steel in a very careful manner. The author suggests that whenever high-tensile sheets are required the parts should be pressed in the machine, and in this way the possibility of over-bending, accompanied by the alternate bending, will be eliminated. For those parts which cannot be pressed in bulk it is suggested that a nickel-steel sheet be used which will stand bending over double, and which, when suitably heat-treated after bending to shape, will give a tensile strength of upward of 40 tons, with a corresponding high yield.

A considerable number of complaints have come to the

*Paper presented to the Aeronautical Society of Great Britain, slightly condensed.

author's notice in the past of failure during the bending of this sheet steel, and this has been largely due to the fact that the edges, after shearing, have not been properly dressed, more often than not even small cracks remaining. This results in a ready local accumulation of stress with subsequent local failure. Especially does this occur when the pieces have been roughly cut by means of a chisel.

Welding

This question of small parts made from sheet steel raises the subject of welding. Welding in any form should be looked upon with disfavor in connection with aero work. The skilled welder even may think that he has made a good job of a weld, but it is usually almost certain that a metallographist could demonstrate that he has not done so. The drawbacks are two-fold. First, the material has to be put into a bad (most likely burnt) condition in the neighborhood of the weld, and, secondly, unless the welder is a perfect artist he leaves oxides lying in the path of the weld. We do not want to condemn welding in a general way, and, while welding is, in other fields, a useful process, it seems to be a little too risky in aero work if it can possibly be dispensed with.

It would be useful if contributions could be made to the discussion with regard to the manufacture and properties of steel tubing by those with special experience. Much work requires to be done in this field, and there is much to be learned both by manufacturers and users.

Cast Iron

Since cast iron is used for cylinders and pistons, a few words are probably in place. This material can be conveniently looked upon for the purposes of our comments as a steel matrix containing silicon in solution which is cut up by graphitic plates and free phosphide. If cast iron is suitably made it is strong, and has other properties which experience has shown make it useful for the purposes for which it is used.

It is well worth the while of engineers to look into this question of composition, particularly with a view to obtaining a suitable silicon content. If the silicon be too high, a weak iron is obtained, while if it be too low the fins, for instance, of cylinders will consist of "white" iron and be much more easily broken. A variation in composition without a corresponding modification in feeding arrangements would lead to unsound and unreliable castings, and, therefore, whatever else is arranged, compositions, when once selected for a particular purpose, should be consistently maintained.

The question of armoring aeroplanes is a live subject, and one giving much scope to the metallurgist. Unfortunately, this is not a subject for open discussion at the present time.

Forging and Drop Stamping

When considering the question of the work that has to be put upon steel, it almost seems a platitude to say that the steel must be well soaked and forged at a proper temperature; yet experience teaches us that it is well worth emphasizing on every possible occasion, since so much trouble has arisen, and is arising, from this cause. The alloy steels, too, should be heated up slowly and with care, particularly from the cold until they are thoroughly warmed through, and any experienced forgeman will confirm the great advantage of properly soaking the material. Internal rupture of the material is quite possible with under-soaking, whether it be due to ignorance or to rushing production. There is another aspect of the forging question, *i.e.*, different parts may be forged in different ways, and there is probably no better example than a crankshaft. In this connection not only must it be considered as to how much work may be locally put on the material, but also where the forging operation will leave the central, less homogeneous, and less reliable portion of the material. The method of stamping aeroplane cranks by which the bloom is forged to crank shape in two or three heats has been advanced as a desirable method. This, however, like most other processes, is open to criticism. To produce satisfactorily a crankshaft by this means, the temperature of the material must be judged with great care, as, owing to the severe punishment which the steel locally receives, it may even be permanently injured. The forging of the different items really requires a paper dealing especially with that aspect of the matter. One point, however, which is important and worth emphasis is that the several parts shall receive a requisite amount of work and a minimum of re-heating upon parts not subsequently re-worked, the work being put upon the material at suitable temperatures.

Mr. Stubbs has dealt recently with drop stampings for the automobile industry, and his remarks *re* the technique apply obviously equally well to aero work. As he says, "Drop forgings may be defined as the art of causing metal in the hot and plastic state to flow into cavities formed in one or both of a pair of dies." Obviously, then, the art will depend largely upon the skill of the drop-stamper in determining the correct temperature at which to work his steel. This temperature must necessarily vary with different steels, some permitting liberties to be taken while others will not, and also with the size and configuration of the stamping. Some of the steels used in aero work need extremely careful handling if drop stampings are to be made from them, while there are other steels which probably the drop-stamper will be wise to avoid.

Difficulty As Regards Configuration

It will be appreciated that if certain designs of parts are to be produced, owing to the unavoidable difficulty as regards configuration, some steels are probably immediately excluded, and here is only one direction where the drop-stamper and designer can well afford to consult and to take advantage of the steel-maker's experience. Many faults are put down to the steel which can most likely be attributed to the stamper's lack of familiarity with the idiosyncrasies of the materials with which he is dealing. Talking of the designer reminds the author that much time, money and subsequent worry can be saved if that original sinner will remember that the steel maker, drop-stamper and aero engine builder are frequently the heirs of trouble which he not infrequently bequeaths to them. Simplicity in design, absence of sharp corners, acute angles, deep thin ribs, acute bends, etc., are points perpetually held before him as things he should not perpetrate, and be it said there are some signs of improvement. The effect of overheating for drop stamping has already been pointed out on several occasions, and the evil effects do not require any further emphasis. Working too cold is also undesirable, since it produces stresses in the material which may lead to subsequent trouble.

Before leaving the question of drop stampings a word might be said with regard to the heat treatment. Frequently a stamping will be of very unequal thickness in its drop-stamped condition, whereas after machining it will have attained probably fairly uniform thickness. In such cases it would seem desirable that the heat treatment should be done after rough machining, as otherwise it is extremely likely that the material in the heavy part of the forging will not have been put into the same condition as that in the portion of lighter section.

(*To be continued*)

Bay State Registrations Pass 1916 Mark

ACCORDING to the figures compiled by the Massachusetts Highway Commission, there has been an average of 1008 more motor vehicles registered each month since Jan. 1, or a total of 6042 vehicles more than were listed for the entire year of 1916. In other words, while there were 136,809 cars and trucks registered for all 1916 in Massachusetts, there were listed up to July 1, 142,851. Compared to the figures of the first 6 months in 1916 with the same period this year it shows a gain of more than 37,000.

There were 298 more dealers added to the list for 1917 so far than all last year. This gives a total so far of 2275, while all last year there were only 1977 listed.

	Entire Year of 1916	First 6 Mo. of 1917	Increase
Cars	117,615	120,877	2,262
Trucks	18,194	21,974	3,780
Total vehicles	136,809	142,851	6,042
Motorcycles	10,713	8,695	*2,018
Makers, dealers	1,977	2,275	298
Licenses	56,903	37,222	*19,681
Renewals	114,693	78,863	*35,830
Examinations	12,506	8,759	*747
Receipts	$1,558,814.25	$1,607,796.03	$46,981.78

*Less.

Japan—An Empire with 21 Motor Trucks

High Cost of Gasoline, Competition of Cheap Labor and Narrow Streets Formidable Obstacles—Alert American Manufacturers Can Develop Big Market

By Hi Sibley

¶ EDITOR'S NOTE—*This article on the transportation situation in the Japanese Empire, with special reference to the possibilities in this field for the American motor truck manufacturer, was prepared by Mr. Sibley, special representative of* THE AUTOMOBILE AND AUTOMOTIVE INDUSTRIES, *after a first-hand investigation of conditions in the leading Japanese cities and principal industrial and agricultural districts.*

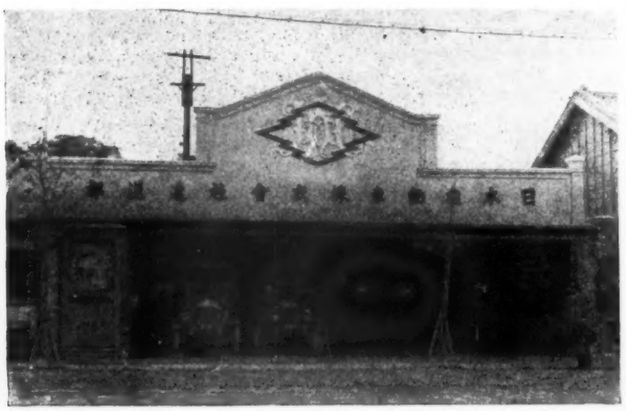
THERE are only twenty-one motor trucks in the whole empire of Japan!

Japan is a man-power country. Probably 95 per cent of all work done is accomplished by manual labor. Loading and unloading ships and trains, propelling huge barges, plowing, carrying back-breaking burdens, sawing great timbers into lumber, hauling merchandise and numberless other heavy tasks are all performed by coolies. No work that can possibly be done by sheer muscular force seems too great, and the physical strength, or determination, of the Japanese laborer is astounding. The writer has even seen a score of them carrying a house bodily on their shoulders, and an American employing coolies in a northern prefecture reports one of them drawing 3000 lb. on a two-wheeled cart over indifferent roads. He was so amazed himself that he had the load weighed as a record.

Transportation by Man Power

Even in Tokyo, the largest city and presumably the most progressive, the great bulk of goods transportation is by man power, from towering cartloads of light merchandise drawn by boys of eight, nine and ten, to uncut timber, steam boilers and heavy machinery by the huskier adults. And women do their share. The amount of labor-saving machinery in use is negligible, and there is a reason for this—the coolie works for 20 to 30 cents per day; in remote districts it has been reported on good authority that he even toils 12 and 14 hours a day for 5 cents! There are no labor unions in Japan worthy of the name, and a man must attain a certain amount of education before he may demand, legally, any wages at all. The great mass of coolies are so hopelessly ignorant that they do not know enough to ask more than their employers see fit to give them.

Horses are used to some extent, but their proportion is fractional. Even then the loads these small Japanese animals—we would call them ponies—draw are as large as some we are accustomed to see a team of heavy draft horses pulling in America. One of the largest and most modern department stores in Tokyo, the Mitsukoshi, employs a fleet of light, horse-drawn delivery wagons, and one or two other stores as well, but these are exceptions to the universal use of coolie carts. Compact as Tokyo is, it has a population equal to Chicago's, and the distances are nearly as great, with the principal railway terminals widely separated. The time wasted in transporting freight and delivering parcels by medieval methods in vogue must be enormous. Four hours for the delivery of a package from a store less than half a mile distant is a personal experience—and the package was marked "rush"!



Truck garage of the Japan Automobile Co. in Tokyo. This concern leases seven trucks to the Imperial Railways. There is only one other establishment of its kind in Tokyo

In the central portion of the city half a dozen horse-drawn sprinkling wagons are employed, and these are filled by a small gasoline motor pump from the Imperial moat, but in all other parts of Tokyo sprinkling is done by one-man carts. These carts hold perhaps two barrels, and are filled from one of the numerous hand pumps or from a ditch, with a long-handled bucket. As Tokyo is a very windy city, and has an area of 60 square miles, there could be much improvement in the dust-laying system; in fact, on dry and windy days it is a great discomfort to venture out at all. Osaka has trolley-car sprinklers, but these can cover only a limited portion of that city.

One Motor Fire Engine in Empire

A few of the principal fire companies use horses, but the great number of fire trucks are drawn by men, and with their antiquated fire-fighting methods a conflagration invariably spreads over a considerable territory before it is subdued. Yokohama boasts the one and only motor fire engine in all Japan; it is an English make, a 75-hp. Merryweather, and during the four years it has been in use has effectually reduced the fire loss in that seaport. The residents are very proud of their distinction.

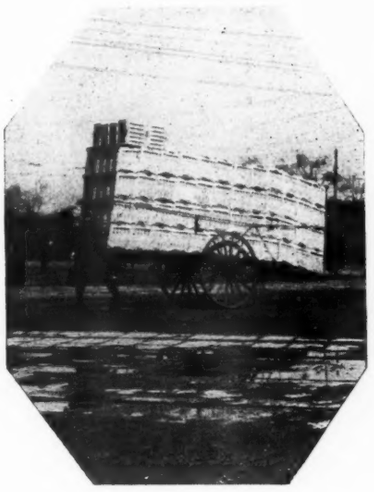
Envious of the prestige which this modern engine gave Yokohama, the city fathers of Osaka decided to have one, too, but when they learned the cost they were staggered, and concluded to fight fires in the traditional way. Only recently a fire wiped out a large section of that busy manufacturing city, and no doubt the loss would have covered the purchase of several efficient motor-fire engines.

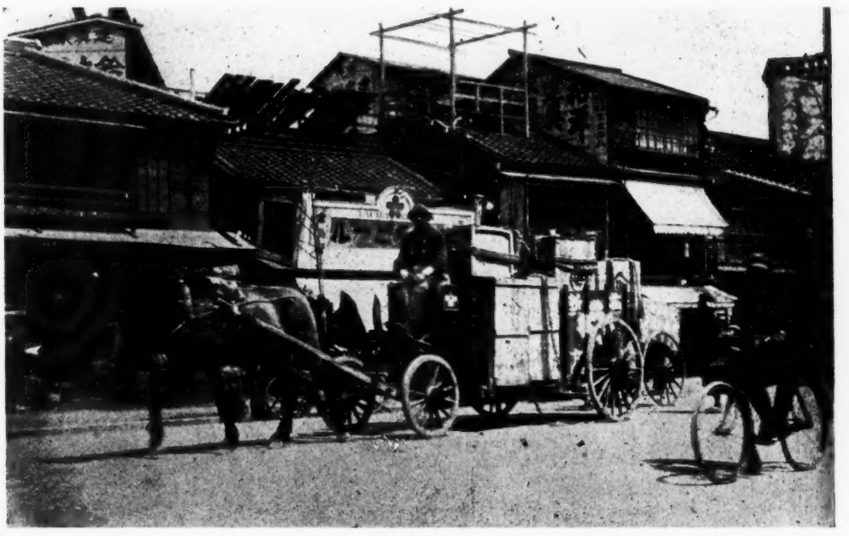
For so-called "quick delivery" of light parcels, the bicycle is used extensively, and motorcycles with side-car attachments are coming into popularity.

Truck a Rare Sight

The spectacle of a motor truck on the streets is so rare as to cause pedestrians to turn around for a second look, and the writer had some difficulty in locating one to photograph. All of these trucks are in express and post office service, with one or two exceptions. An electric service company has an electric truck of its own design for delivery purposes, and two or three Fords have the conventional body for parcel delivery, but the others are Fiats, Isotta-Fraschinis and one Maxwell under contract with the Imperial Government Railways. Cheap coolie labor is the only explanation why mercantile and import houses have not adopted motor trucks, but

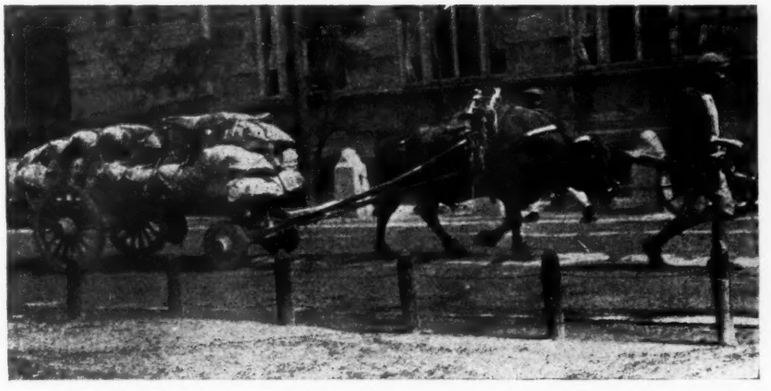
Below—This illustrates the average load for a Japanese adult in transporting goods over roads and streets





An unusual sight. It is very seldom that the Japanese teamster rides on his truck

Why Japan Needs Trucks

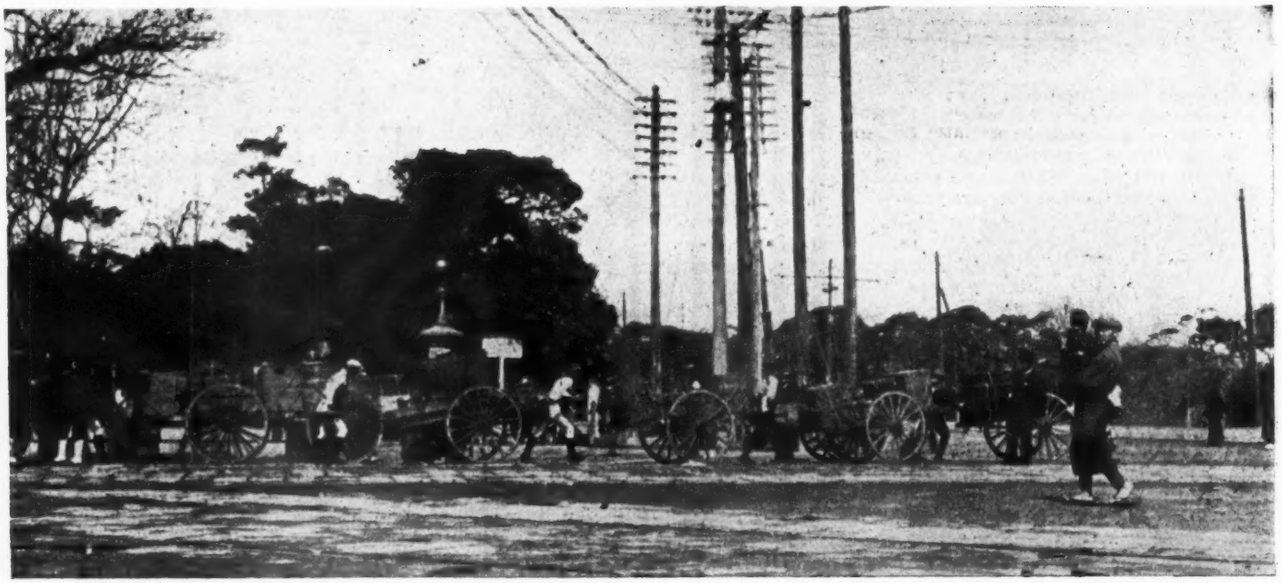


Ox transport in Osaka. Oxcarts are common means of cartage in Osaka and Kobé for heavier classes of merchandise

A Japanese watering cart in action. The coolie pulls a cord to open the valve

Right—A two-man load. The men have a peculiar chant which they use in pulling to secure effective teamwork

Left—There is much hauling of trees, some of them 40 to 50 feet high, with roots. The Japanese are traditional landscape gardeners



An endless stream of coolie cars traverses the highways in Osaka, Kobe and Tokyo

even at that it would seem that the Japanese merchants, who are alert in so many other respects, would have had the enterprise at least to experiment with light delivery cars. In Osaka, the principal manufacturing city and which has had a tremendous boom since the war curtailed many imports, there is more transportation of heavy materials and machinery than in any other city, and here the ancient ox-cart is much in use, as well as in the seaport of Kobé. Not a single motor truck is used for heavy cartage.

Price of Gasoline a Drawback

The main thoroughfares of Tokyo, Yokohama, Kobé and Osaka are wide enough and sufficiently well paved for the practical use of motor trucks of almost any type, and the only obstacle to the general adoption of these efficient carriers is the price of gasoline, which averages about 40 cents a gallon at this writing. Whether this price will be reduced as the motor car comes into more general use is a question, but the present production of gasoline in Japan is about 4,000,000 gal. per annum, with an estimated consumption by motor cars of 100,000 gal. per month. Chauffeur's and mechanic's wages, on the other hand, are extremely low compared with our standards, being from $15 to $25 per month.

American manufacturers of motor trucks have accurate statistics on the cost of transporting goods per ton-mile in various sections of the United States, and in comparison here is a sample of the cost per ton-mile by man-power in Japan: The superintendent of a certain large concern in a remote section contracts for 100 men and women for a total of $11 per day. They average 90 lb. per trip of 500 yd. and carry that load 100 times a day, or a total of 900,000 lb. a distance of 1500 ft. This is equivalent to 17½ tons moved 10 miles at a cost of only $11! The employer who submitted these figures asserts this pace is maintained day after day without letup, in summer and winter. An American motor truck company would hesitate to take on such a contract at that figure. The cost of carriage per ton-mile is much higher in the cities, but even then is absurdly low in comparison to our standards. All of which throws much light on the tardy adoption of the motor truck in Japan.

Just what is being done, or has been done, in the way of military motor trucks in Japan is difficult to ascertain. On this subject they are extremely secretive, and discourage investigation in a most effective manner. Only recently an American innocently—so he claims—wandered into a military zone and spent a month in jail for it, which punishment has dampened the curiosity of other inquisitive, or thoughtless, foreigners.

It is known, however, that some months ago the experiment was made of sending a number of military cars from Tokyo to Osaka. It is said that the cars which survived the difficulties of the journey took 5 days to cover the 350 miles, and only reached their destination at all by exertions that would have meant much wasted labor in war time. It is not likely that the experiment of dispatching cars a long distance in Japan would be attempted under present conditions in time of war, both because of the time that would be lost in sending munitions over the difficult roads and the labor that would be required to deal with breakdowns, which could be far better utilized in other ways. In consequence the Japanese armies would be compelled to transport on the railways.

Here we have railways of narrow-gage, and according to rumor are already regarded by the military authorities as inadequate for the purposes of transport should the necessity arise. Proposals have been made to convert the lines into wide-gage in order to overcome the difficulties involved, but in this case the expense and disorganization of the railway service by a break in the gage would be serious.

Wider Roads Needed

Motor car men familiar with the situation maintain that the object of greater mobility of transport could be effected much more conveniently and at far less expense by widening the main roads and improving the gradients, as well as building substantial bridges. This, of course, would be of great benefit to the country at large by improving inter-city communication, relieving the railways and reducing the cost of transport. No doubt such a project will be put into full

Typical Japanese freight train. The cars are of English pattern and the rails are narrow gage, 3 ft. 6 in.

swing when the Japanese military attachés return from Europe where they have observed the great work accomplished by the indispensable motor car.

The military cars mentioned in the experiment are said to have been of Japanese design and build, and of insufficient power to negotiate the grades and occasional stretches of heavy road, but were it not for some of the weak bridges which had to be strengthened, it is very probable that some of our staunch American motor trucks, such as were used in Mexico, would have made the trip in a highly satisfactory manner. There are no roads in Japan any worse than those encountered by our trucks on the Mexican punitive expedition, and the main highways here are in general fully as good as the average American road, except for their limited width.

Japan will never be a market for the farm tractor, for the average farm is just about large enough for a tractor to turn about in. Only one-tenth of this mountainous country is arable, and the farms average one and a half acres each; moreover, the principal farm product is rice, alternated with wheat, grown in small patches. Rice being cultivated under water, the coolie works up to his knees in mud and turns up the soil with an odd pronged hoe. As many women as men are employed in this work.

Future of Motor Roadbuilding Tractor

The time is not far away when the motor roadbuilding tractor will be in demand. Without doubt the next great national project is going to be a thorough rebuilding of the main trunk highways, and when this is done, so many sections are without railways, on account of the mountainous nature of the country, that the economical truck transport and railway feeder is sure to come into general use. The Japanese may have been slow to see the advantages of the motor truck over their ancient methods of transport, but in other lines they have been quick to adopt European and American practices. Business men have almost universally discarded the incumbering kimono for the more convenient European clothes; modern buildings are being put up all over Osaka and Tokyo, street cars, interurban trams and trains are all run on modern and efficient systems, and the motor truck, that essential feature of all progressive communities, is certain to fill its place in the very near future.

Several importers are now contemplating the active exploitation of motor trucks and light delivery cars. Once the pioneers have demonstrated their efficiency, Japan should become a tremendous market. For instance, there is Osaka. The city is manufacturing mad. There are five factories now to every one before the war. Manufacturers are taking every advantage of the new markets opened to them, and as rapidly as possible are adopting foreign methods of manufacture. The visiting American is asked innumerable questions concerning the latest methods employed in the States, and the Japanese are extremely sensitive when they learn they have been using obsolete methods. Not having any precedent, or any standard of comparison, they cannot realize how antiquated their means of transport is, but once a few enterprising concerns establish motor truck service, there is no question that these alert manufacturers will adopt them universally.

An old woman in package delivery service

Small trucks used in the government mail service

There seems to be some feeling that the motor car will throw the rikisha men out of work, and the motor truck will take the coolie's job away from him, just as it was predicted in America when the first cars appeared that the horse would become an institution of the past. These short-sighted people cannot see that the motor car is creative rather than destructive and that its advent has meant more work for everyone. Of course, the motor car did not have to meet conditions in America that we have here, but the nation is rapidly becoming revolutionized.

Briefly then, the three obstacles confronting the motor truck are the high cost of gasoline, the competition of cheap coolie labor, and the narrow streets in old sections of the cities. Any one of these appears formidable enough at first glance, but it must be remembered that conditions in Japan are rapidly improving. As a nation Japan wishes to be the equal of any other nation, and in many respects she has proved that she is. She takes it very much to heart when a foreigner comes here and says, "Why, you are hopelessly old fashioned; we did this way and that way a hundred years ago," but she profits by the criticism and corrects her shortcomings as promptly as practicable.

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Australians Protest Against Makers' Methods

RESENTMENT has been shown by automobile dealers in Australia over the action of an American automobile manufacturer in regard to the payment for cars. This maker has demanded that his dealer place in New York a letter of credit for a very large amount of money, payable at a New York bank, and not through London. Furthermore, this letter shall be irrevocable, and shall be paid even if a typographical error is made.

American automobile business methods are not generally satisfactory in Australia, that is from an importer's point of view. This latest question has aroused great resentment. A number of the dealers are of the opinion that some of the American makers are trying to change the center of money from London to New York, but the real reason seems to lie in the fact that the makers are planning to protect themselves from the effects of a threatened embargo on automobiles by Australia. When the British Government and the Indian Government brought in an embargo on automobiles, they gave licenses to those importers who had lodged moneys in America for payment of drafts for all cars not delivered from the factory.

Acetylene Welding in Automobile Engineering*

Part II

Welding Metals of Various Thicknesses—Cost Figures —Skill Is Essential in Operating, Dismantling and Assembling Blowpipes—Use of Fluxes—Repair Work

By Herbert L. Towns

IN high-pressure blowpipes the gases flow at a very low speed, and back-firing is experienced. Safety devices are usually fitted, rendering them safe to handle. The medium-pressure blowpipe is the type that is most commonly used, and has very few disadvantages. In this type of blowpipe back-firing is very unlikely, due to the pressure of the gases, which keeps the speed high.

The only real danger experienced in the use of the blowpipe is due to back-firing, and this is provided for by the fitting of safety devices. Attempts have been made to cut out this small piece of the installation, but the results have been far from satisfactory.

The blowpipe is usually made of brass, and is constructed in such a way that it is impossible for the gases to mix before they reach the welding head or mixing chamber. The nozzle is usually a detachable piece, so that the size of the orifice can be varied to suit the consumption of gases required for different classes of work. Blowpipes are usually supplied with a series of nozzles, which vary according to the consumption of the gases required for the different classes of work to be done. The size of the nozzle is determined by the consumption of acetylene per hour, and the sizes have a large range, being made to use acetylene at rates varying from 1 cu. ft. to 100 cu. ft. per hour. These nozzles are made of copper, which metal withstands the heat much better than other less suitable metals. The size of nozzle suitable for welding various thicknesses of metals may vary slightly according to the make of blowpipe used, but some idea of the consumption of acetylene can be gathered from Table III, and the approximate rate at which the various thicknesses of metals can be welded by using nozzles to give the consumptions shown therein is given in Table IV.

TABLE IV

Thickness of Metals to Be Welded, In.	Approximate Run per Hour, Ft.	Thickness of Metals to Be Welded, In.	Approximate Run per Hour, Ft.
1/32 to 1/16	39	1/8 to 3/4	4
1/32 to 1/16	38	3/4 to 1	3
1/16 to 3/16	20	1 1/4 to 1 1/2	2
3/16 to 1/4	10	1 1/2 to 2	1
1/4 to 1/2	6		

Some idea of the variation in costs of welding various thicknesses of metals can be gathered from Tables III and IV. To take a comparison, say 1 ft. of welding is to be done on a metal having a thickness of 1/20 in., and also a similar length on a similar metal having a thickness of 2 in. In the first case the consumption of oxygen and acetylene is 0.051 cu. ft. and 0.038 cu. ft. respectively, while in the second case the consumption of oxygen and acetylene is 125 cu. ft. and 100 cu. ft. respectively. Hence, the proportion for the costs of the gas alone is as 1 to 2500; on top of this the time taken for the operation is thirty-nine times greater in the second case than in the first case.

It has already been mentioned that the blowpipe is an instrument of simplicity and easy to handle, but also being an instrument of precision, very great care is called for in its maintenance if a perfect and economical working is to be experienced. The cleaning of the nozzles should be attended to at regular intervals, and great care is required here, as the size and shape of the orifice should not be altered, because any change in this direction will cause more or less serious results when used again. Any increase in the size of the orifice of a nozzle would tend to decrease the velocity of the mixture at the exit, and the tendency to back-fire would be increased. It is therefore advisable in cleaning a nozzle to use some instrument which is not harder than the material of which the nozzle is made, and a suggested suitable instrument is a piece of brass wire, which should be run through the opening.

In order to insure that the interior of the blowpipe is kept free from any obstruction, the blowpipe should be disconnected from the feeding tubes and the nozzles connected up to the oxygen tube, then the opening for feeding oxygen into the instrument should be temporarily closed, and a current of oxygen blown through the acetylene passage. By playing on the end of the acetylene passage with the finger a fluctuation in the exhaust of the oxygen is caused, and the clearing of the interior of the blowpipe is accomplished.

Skill in Assembly Required

It is advisable to avoid the dismantling of a blowpipe by any except persons thoroughly experienced in this class of work, as the putting together of the parts requires a certain amount of skill, the accuracy of which governs the correct working of the instrument.

The starting up and stopping of the working of blowpipe should be done in a methodical manner, and the following are suggestions for doing this, references being made to Fig. 9, which shows an outline of the apparatus in the vicinity of the operator: First, the checking of the hydraulic safety valve for water-level should be done, by opening the overflow cock, and recharging with the water if necessary, and the overflow cock closed. Now, with the lower acetylene tap *B* closed, the tap *C* should be opened, then the oxygen valve should be closed and the cylinder opened by means of the key. The adjusting screw should then be adjusted so the required working pressure is registered by the gauge. Now the tap *B* should be opened, and when the acetylene is smelt at the nozzle it should be ignited, then the oxygen tap should be opened to admit the oxygen to the blowpipe. It will be necessary to correct the oxygen pressure, which will have dropped, as will be seen by the gage, due to the opening of the tap. Now by means of the tap *B* the acetylene should be shut down until the flame is normal, as shown in Fig. 6. On stopping work the acetylene tap *C* should be closed first, then the oxygen tap *D*, and in case of work being completely stopped the oxygen cylinder should also be shut off and the pressure released from the regulator.

In case of a back-fire the tap *C* should be immediately shut off, and the blowpipe should not be relighted for a few seconds. Before the lighting up of the blowpipe, in the morning, it may be necessary to disconnect the acetylene pipe from the blowpipe, in order to drain out any accumulated moisture.

*Paper read before the Coventry branch of the Institution of Automobile Engineers—slightly condensed. Drawings from *Engineering*.

The use of welding instruments is a comparatively simple task which can be easily acquired by very short tuition or practice, but to become an expert welder is something mucn more difficult. In order to be able to execute welding in a manner worthy of the term welding it is necessary for the executant to have some knowledge of the properties of the metals which are to be welded. The knowledge of the properties of metals is useful in the preparation of parts to be welded, and it is often due to the lack of adequate preparation that comparatively simple operations in welding prove to be failures. The metals commonly used in the engineering industry are the only ones we need consider, these being: cast-iron, malleable iron, wrought iron, steels, copper, brass and aluminum.

Welding Rods

Welding rods are used to replace any metal that has been taken away, either due to damage or due to preparation of the article to be welded. Welding rods should be used, except in cases where very thin metal, say less than 16 gage, is being welded. Care should be taken in the use of welding rods that no impurities are introduced into the weld—for instance, the rods should be kept free from dirt or rust. Rods having rust on them are oxidized, and it has already been stated than an oxidized weld is not satisfactory. It is advisable to use welding rods supplied by firms who specialize in the manufacture of this class of goods.

In welding cast-iron work a welding rod of alloy iron should be used, known as silicated cast-iron rod. These rods have a fair percentage of silicon in them, which tends to take the brittleness out of a weld by reacting with the carbon in the iron.

In welding steels a rod of Swedish iron is almost invariably used, which on account of its purity makes a weld of very even grain, and easily machinable. In cases where special classes of steels are being welded, such as "high carbon steel," "nickel steel," etc., rods of special composition should be used—for instance, in high carbon steel there is the possibility of the carbon burning when the metal is being fused, and the welding rod should contain an excess of carbon in order to replace that which is burnt, so that the finished weld will be as nearly as possible similar to the metal being welded.

Rods of phosphor-copper are used for adding to welds made in copper, while for brass a rod of brass is used. In the case of these metals being welded in the form of sheets, the welding rod is really in the form of a wire. In welding aluminum a rod of aluminum should be used. These rods are specially alloyed, in order to give the necessary even flow of metal.

In all cases the welding rod should not be added until the metal being welded is melted, and for this reason the rods are alloyed to give them a lower melting-point than the metals being welded, so that the filling rods can be added without allowing the metal to cool down, for if molten metal comes in contact with cooler metal the result is simply an adhesion, and not a weld.

Fluxes Remove Impurities

Flux is used in welding as a cleansing agent, and is usually in the form of a powder. In the melting of metals it often happens that impurities will be left solid after the metal has reached fusing-point, also it often happens that oxides form which have a higher melting-point than the actual metal—for instance, in aluminum, as already mentioned, alumina forms, which has a melting-point much in excess of the melting-point of the aluminum (about 5000 deg. F.). The purpose of using flux is to float off these impurities, or to produce a deoxidizing effect which will retard the forming of oxides, and therefore keep the metals clean for welding together. These fluxes, like welding rods, form a specialty in manufacture, and include various mixtures. Samples of flux for iron and flux for copper and brass are here shown. Fluxes should not be used by spreading on the weld, but should be used by dipping the welding rods into them and transferring to the weld.

Preparation of Parts to be Welded

It is important to make some preparation to the pieces to be welded, and in this there is a certain amount of scope for sound judgment on the part of the welder to make the most suitable preparation for the nature of the weld to be made. However, for straightforward work there are one or two points which apply generally. Plate work of a thickness of less than 1/16 in. can be welded with straight edges (Fig. 10); then for thicknesses between 1/16 in. and 3/16 in. the

Fig. 3. BACK PRESSURE SAFETY VALVE.

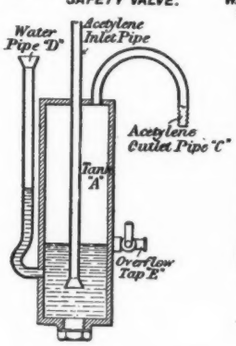


Fig. 4. BACK PRESSURE SAFETY VALVE SHOWING WATER UNDER PRESSURE OF A BACK PRESSURE.

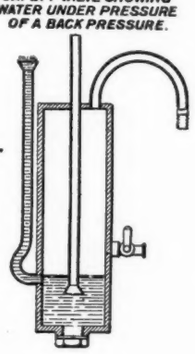


Fig. 5. FLAME PRODUCED BY A MIXTURE HAVING AN EXCESS OF ACETYLENE.

Fig. 6. NORMAL FLAME.

Fig. 7. FLAME PRODUCED BY A MIXTURE HAVING AN EXCESS OF OXYGEN.

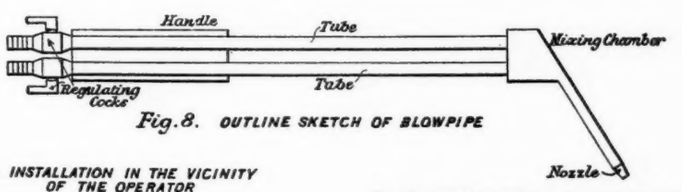


Fig. 8. OUTLINE SKETCH OF BLOWPIPE

Fig. 9. INSTALLATION IN THE VICINITY OF THE OPERATOR

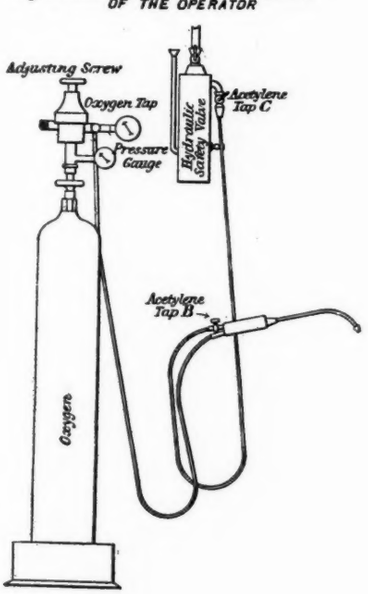


Fig. 10. FORM OF WELDS FOR METAL OF LESS THAN 1/16 INCH THICK.

Fig. 11. FORM OF WELDS FOR METAL OF, FROM 1/16 TO 3/16 INCH THICK.

Fig. 12. FORM OF WELDS FOR METAL OF, FROM 3/16 TO 1/4 INCH THICK.

Fig. 13. FORM OF WELDS FOR METAL OF MORE THAN 1/4 INCH THICK.

edges of the pieces should be bevelled slightly (Fig. 11). With plates or pieces of thicknesses between 3/16 in. and ⅜ in. the angle of the bevel should be increased (Fig. 12), and for thicknesses exceeding ⅜ in. the pieces should be double-bevelled (Fig. 13). In all cases the bevelled edges should be cleaned to remove any oxide that may exist. This bevelling is necessary so that the operator can reach the far side with the flame and welding rod, as in cases where attempts have been made to weld pieces of metal of a reasonable thickness without first bevelling the edges the metal has melted throughout the whole thickness at the same time, and the small white flame has swept the molten metal away on the near side, thus spoiling the weld.

Incidentally it may be worth mentioning here that the small white portion of the flame should never come into contact with the metal.

Preheating Prevents Cracks

One of the sources of trouble in welding is the liability to develop cracks, which result in a broken weld, but this liability can be greatly reduced by the practice of preheating. In the welding of metal it is necessary to raise the temperature of the metal from that of the surrounding air to the melting-point of the metal, and one of the advantages of preheating is that the whole piece of metal to be welded can be expanded, so that after the weld has been made a uniform contraction will take place, and prevent breakage of the weld. It is not the expanding of the metal that is the cause of damage so much as the contracting, for a weld may appear to be good and satisfactory after completion, but unless some allowance has been made for the contraction a break is more likely than not to occur.

Applications to Automobile Engineering

Welding is not a practice that is adopted to any great extent in the production of automobile parts. One of the outstanding features of welded parts is the fact that comparative lightness can be obtained, where the part is not subject to much stress, by the use of thin metal. This fact should be taken advantage of in the manufacture of light cars as much as possible. Of course without considering light car design it is impossible definitely to state which parts should be built up and welded. In general automobile practice the extreme lightness which is characteristic of the light car is not required, hence, the practice of welding is not adopted to so great an extent as would be done in case of necessity; however, cases of necessity do occur.

Rear axles can be built up of steel tubes, with a central bronze casting, by welding, this being the only method of making a sound permanent joint. Parts such as water pipes should be built up by welding, all flanges being welded to the pipes, and branch pipes welded to the main pipe. Flanges can be welded to exhaust pipes, and silencers can be completely built up by welding, but this is not altogether practicable, on account of the difficulty of dismantling if it becomes necessary for cleaning inside. Brackets of various description can be built up by welding, but where thin metal is required pressings become a reasonable competitive proposition; however, where different thicknesses are required on a part pressings are impossible for the complete part. Radiators made up of pressings welded together are quite a commercial proposition, especially for commercial vehicle work, and can be turned out in quantities quite easily by an intelligent operator. For touring car work cast radiator tanks and brackets are preferable on account of a better appearance being obtainable.

Welding in Experimental Department

In the experimental department of an automobile manufacturing works welding can be applied with some advantage, for the cost of patterns for castings might be eliminated to a great extent. Alterations to the compression of an engine can be carried out by cutting the connecting-rod and welding up to make it either longer or shorter as required. Lugs or bosses can be welded to castings or other existing parts; in fact the practical use of welding in the experimental department is almost unlimited.

In foundry work the practice of welding is also applicable, as in the trimming of castings slight breakage frequently occurs, and repair by welding is preferable to scrapping the casting.

Repair Work

Breakages are more or less frequent in almost every detail used in the construction of automobile work, and previous to the adoption of oxy-acetylene welding for the repair of such breakages the parts had to be replaced at some considerable expense to the owner. Now that the art of repair to breakages has become a satisfactory proposition, the parts thrown over to the scrap heap by the automobile owner are less numerous. However, to the automobile manufacturer, the carrying out of repairs is a much more satisfactory proposition by replacement than by patching up the existing part, as regards both finance and labor, except in cases where the part is of ancient design and some difficulty would be experienced in getting a single part through the works.

A common breakage in cylinders is in the water jacket, often caused by the freezing of the water, and such breakages can be repaired satisfactorily by welding. One point worth noting is that all damaged metal should be cut away in order to make a clean surface for welding.

Base chambers and gear cases are among the parts requiring careful handling and preparation in repair work, the main difficulty in these parts being the liability for error in the alignment of the bearing. However, by careful preparation in the way of adjusting the broken parts and preheating, this difficulty should be overcome. Where the metal is damaged the damaged parts should be cut away and a new piece welded in. No satisfactory result can be obtained by pouring molten metal into a crevice, as adhesion takes place instead of the new and old metals becoming joined as one piece, with the result that when the new metal cools down, cracks are almost certain to appear. Parts such as base chambers and gear cases are mostly made in aluminum, and in repairing aluminum the work should invariably be preheated to about 600 deg. Fahr.

Repairing Frames

Breakages in frames can be satisfactorily repaired by welding, but as a rule it is advisable to back up the portion of the frame in the vicinity of the repair with a plate, because a breakage in a frame is a sign of weakness due more often than not to unfair distribution of the load on the part of the owner or owner's representatives.

Teeth can be welded to broken gear wheels, but this work should be carefully adjusted and clamped, then preheated before actually welding. The tooth or teeth to be welded in should be positioned by a plate, having slots cut in at the correct pitch of the teeth, so that the plate fits to portions of each of the two pieces to be welded together.

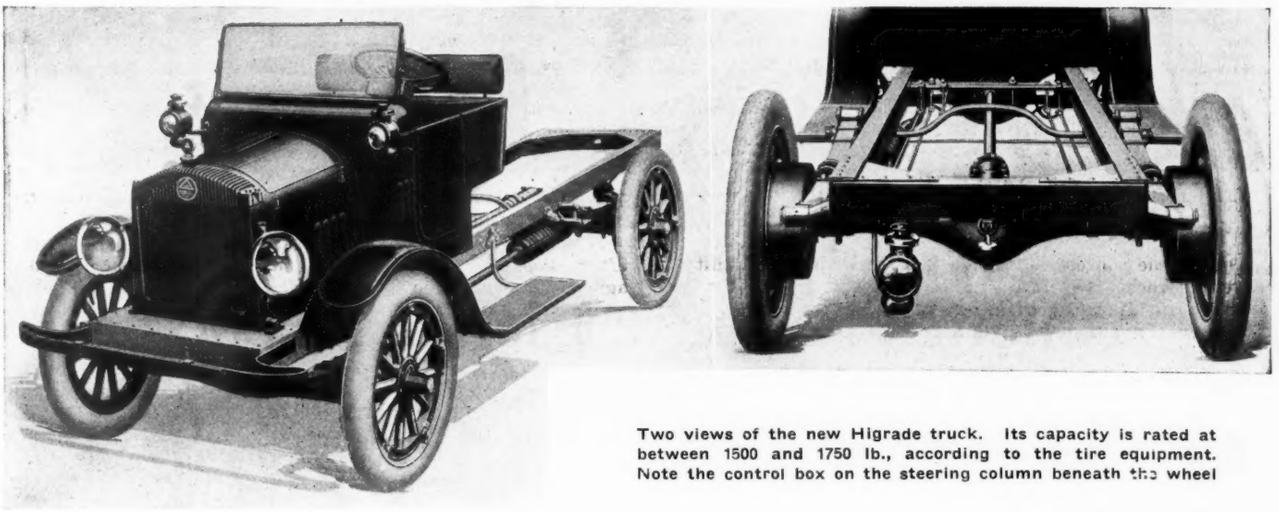
Oxy-Acetylene Welding Practice

OXY-ACETYLENE WELDING PRACTICE. By Robert J. Kehl, M.E., published by the American Technical Society, Chicago, 102 5½ by 8-in. pages, 111 illustrations. Price, ??.

Oxy-acetylene welding is now largely used both in the manufacture and the repair of automobiles. In the manufacture of the modern car it finds its widest application in the production of the body, the rear axle, manifolds, etc. The present work covers the whole field of oxy-acetylene welding. After fully describing the process generally and its various elements in the first part of the book, and devoting a few pages to the related processes of electric welding, the author gives some useful hints regarding the technique of acetylene welding, which are fully illustrated. He then takes up the different metals that may be welded and their properties that affect the success of the welding process. Extensive instructions are given regarding the preparation of joints to be welded in sheet and rod stock and in castings.

Welding of each metal, such as cast aluminum, cast iron, copper, sheet iron, brass and bronze is dealt with separately. Some space is also given to cutting of metals by the oxy-acetylene flames and to lead burning. The concluding part deals with the use of the oxy-acetylene torch in the automobile repair shop. Throughout the work the examples are taken from automobile practice, for, as the author remarks, in this field almost every class of welding is covered.

Higrade Truck of Sturdy Design



Two views of the new Higrade truck. Its capacity is rated at between 1500 and 1750 lb., according to the tire equipment. Note the control box on the steering column beneath the wheel

DESIGNED with the end in view of producing a high-class truck made from truck rather than passenger car parts, the new Higrade commercial vehicle offered by the Higrade Motors Co., Grand Rapids, Mich., is rated at between 1500 and 1750 lb. capacity when fitted with standard equipment. This consists of 34 by 4½ pneumatics, front and rear. By the use of oversized tires, 35 by 5, which will fit the rims furnished with the truck, its capacity may be increased 25 per cent without overloading the springs.

The Higrade company is headed by J. Elmer Pratt, who has been connected with the motor vehicle industry since 1893 and who was identified with the Pierce-Arrow Motor Car Co., Buffalo, N. Y., for 7½ years. The company is at present erecting a factory in Grand Rapids, and expects to start active production early in July. The first 1000 vehicles will be made at the experimental shops of the company at Harbor Springs, Mich., where it has a plant capable of a five-vehicle-per-day capacity.

Truck Made of Standard Parts

The truck is assembled mostly of standard parts; has its motor under a hood forward of the dash, final worm drive, and is equipped with electric starting and lighting.

One of the features of the vehicle is a specially designed lamp bracket attached to the side of the radiator casing so that the electric headlight may be adjusted for the proper focusing of the rays at any given distance ahead. It is not necessary to dim the lights when passing other vehicles on the road, and the adjustment once made will always stay in place.

This is accomplished by mounting the headlight casing on a vertical bar pivoted at its lower end to the radiator casing and working in a slotted bracket at its upper end, so that the entire lamp may be swung forward or backward about the bottom pivot to give the desired focusing effect.

HIGRADE SPECIFICATIONS

Capacity, lb.	1500-1750
Wheelbase, in.	115
Tires, front	34x4½
Tires, rear.	34x4½
Bore, in.	3¼
Stroke, in.	5
N. A. C. C. hp	16.92
Speed, r.p.m.	1,000
Speed, m.p.h.	20
Gear-ratio in high gear	4.56-1
Final drive	Worm

The Wisconsin engine is mounted under a conventional hood forward of the dash, and has incorporated with it a dry-plate clutch and three-speed, individual-clutch type gearset. The cylinders are cast in block with the upper half of the crankcase. The valves are all located on one side of the engine and are driven by a single camshaft. The intake and exhaust valves are interchangeable.

Cooling is by centrifugal pump employing a cast aluminum case Fedders radiator and having a cellular core. The carbureter is a Zenith fixed-nozzle type, bolted direct to the cylinder block intakes and provided with a shut-off to facilitate starting in cold weather. It is controlled by a hand lever mounted on a small control box attached to the steering column directly under the driver's handwheel. The carbureter is fed by gravity from a pressed-steel fuel tank mounted on the dash. The engine is fitted with a Simplex governor, driven off the propeller shaft and limiting the maximum speed of the truck in high to 20 m.p.h. A high-tension magneto is used for ignition and a separate lighting generator is provided for the electrical equipment, which also includes a starting unit with Bendix drive.

From the engine the power is transmitted to a Borg & Beck single-plate clutch and thence to a Cotta three-speed selective gearset of the individual clutch type. It is then transmitted to the Sheldon worm-driven rear axle through a single shaft with a universal on each end. The rear springs, which are the semi-elliptic type, are arranged to take both the driving torque and propulsion.

The brakes are both on the rear wheels and are of the internal-expanding type. The frame is of pressed steel of channel section, 4 in. deep, with horizontal members 2½ in. wide.

Artillery Type Wooden Wheels

The wheels are wood and are made up in the artillery type with twelve spokes each. The spokes are mounted centrally in the felloe. The steering gear is a Lavine truck design of the semi-irreversible worm type. In addition, a control box is mounted directly in front of the steering column and just in below the steering wheel. This box has all the switches and controls for the electrical instruments, the speedometer and the carbureter adjustment.

The standard equipment includes a speedometer, Boyce Moto-Meter, headlights, windshield, dash and rear oil lamps, electric horn, tool box and tools, extra rim and tire-holder, oil can and 1 gal. of oil. The cab is inclosed with fore doors and is furnished with a full-width upholstered seat and backrest. The frame length back of the driver's seat is 104 in. and the bed floor for the body is but 31 in. from the ground.

Fisk Park is a strong influence in stimulating athletic activities in the factory. It has two baseball diamonds, a half-mile running track and three tennis courts

Athletics Increase Fisk Efficiency

Company Finds Health Best Secured by Outdoor Sports—Big Recreation Park Is Self-Supporting—Hospital and Sanitary Precautions Also Provided

RECREATION is the prime essential to efficient work is the opinion of the Fisk Rubber Co. employees at Chicopee Falls, Mass.; and acting on that theory the workers at the Fisk plant have built up one of the strongest factory athletic associations in the country. The Fisk company has found that the greatest satisfaction on the part of the workers is obtained by encouraging them to support and manage their own outside activities.

Activities Are Self-Supporting

Social activities among factory groups have become very popular in the past 10 years. Clubs, insurance, community nurses, libraries, restaurants and other features which may be obtained at small expense when a large number subscribe are rendered available to the members of many factory organizations. Fisk workers have the use of a medical staff and are guarded by safety precautions, too; but the leading idea in the outside activities of this factory is that athletics in themselves are a creator of health, and make the need of a doctor less likely.

Fisk workers lay emphasis on the fact that their athletic enterprise is self-supporting and self-controlled. The memberships of $1 annually from approximately 3000 members, the gate receipts from the ball team which represents the factory, and the income from dances and entertainments that are held make it possible for the Fisk Athletic Assn. to carry out a very attractive schedule of recreations during the year.

Athletic Field Being Developed

Fisk Park, the expenses of which are underwritten by the company but actually paid for by the athletic association, is a big stimulus to athletic interest at the factory. This is a 30-acre layout formerly known as Imperial Park which once was a race track. The field provides two baseball diamonds, a ½-mile running track, and three tennis courts. A football gridiron has recently been laid out on the course and basketball courts have also been introduced. The field is also equipped with a grandstand. Back of the athletic field on the same property are a pavilion and a grove, which are used for dances, picnics and carnivals.

Two Divisions of Sports

Sporting activities at the Fisk plant may be divided into two classes: the class which represents the factory in the athletic world, and the inter-departmental sports. In baseball, for instance, there is one team, the Red Tops, which represents Fisk and plays with representatives from other

Among the many features devoted to the comfort of the employees is a women's restroom

An administration hospital is maintained, where injuries may be treated immediately

factories; and there are six teams within the organization.

The Fisk Red Tops is an amateur team. All the members are employed at the factory. But it is a fast nine, and is in a class with most of the semi-professional teams of New England. The strength of the Red Tops may be judged by the fact that in the line-up this year were included Wiglesworth and Spillane, both formerly of Holy Cross; Omsby of Brown University, and Greenhalge, a former Portland player in the Eastern League.

One interesting feature to the automotive industry will be the western trip of the Red Tops which will take place some time late this summer, when the Fisk nine will play a schedule including Goodyear, Goodrich, the White Co. and one or more automobile teams in Detroit.

In addition to the baseball reputation made by the Red Tops the Fisk Athletic Assn. got its name into the track world by an amateur track meet staged at Fisk Park on June 17. That the Fisk company workers have a strong organization is shown by the fact that this meet attracted intercollegiate athletes to compete, such as Overton of Yale and Jones of Middlebury.

Where the Factory Gains

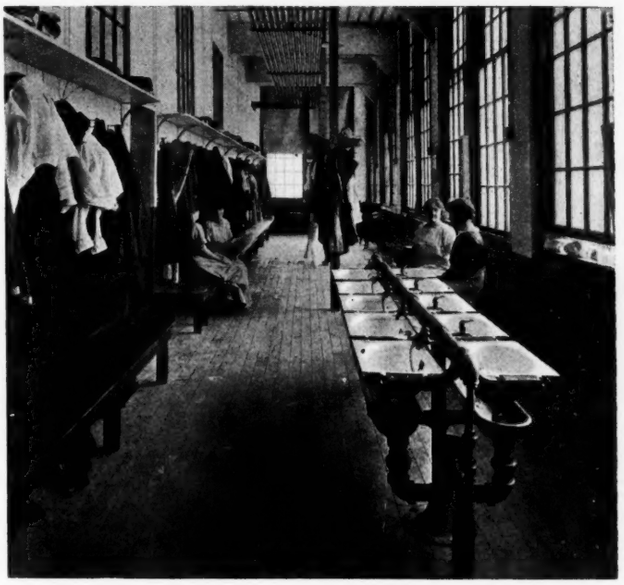
From the standpoint of the factory, these athletic games, where the Fisk teams meet other aggregations and carry out big athletic events at Fisk Park create a spirit of enthusiasm such as is felt by a member of the New York A. C. or a college man for the success of the enterprise with which he is connected. Enthusiasm means better results both for the worker and for the organization.

But the outside athletic feature of the Fisk association is only a part of the story. There is a six-team league which gives an opportunity for the best athletes in the factory to play every Saturday. With more than fifty-four places to fill in this league and a list of substitutes to be kept on hand, it is evident that any man with a little athletic ability has a chance to qualify in part of the game at least. Furthermore, the diamond is open to use for the members of the association at any time, and pick-up games are played by those who are not fortunate enough to make the league teams.

The league is run in regulation style with set schedule, paid umpires, and everything to insure a fair deal to each nine. The teams are made up from different departments of the factory, such as the office force, the tube room and so on. Three games are played every Saturday afternoon.

Newer Sports

Baseball has been a Fisk feature for some time, but the association members are now developing other sports. A handball court is now being laid out at Fisk Park, and the game will be played extensively by the Fisk Athletic Assn. Several sets of quoits have been purchased and will be laid out at the plant. Tennis is a new sport at Fisk Park this season and the three new courts are proving popular. This is an activity in which the girls also are interested, and it is possible that a men's tournament and a women's contest will be held in the fall. Basketball will also be a prominent feature in the winter both for the men and women.



Cloakrooms are provided for women employees. There are also 6000 steel lockers for the workmen

Athletics, of course, are not the only means for having a good time; and the Fisk workers have been having a number of social events this year at Fisk Park, of which the most notable was the carnival, where local talent provided a minstrel show, refreshment booths for the benefit of the Red Cross, and electric decorations in the grove.

What the Girls Are Doing

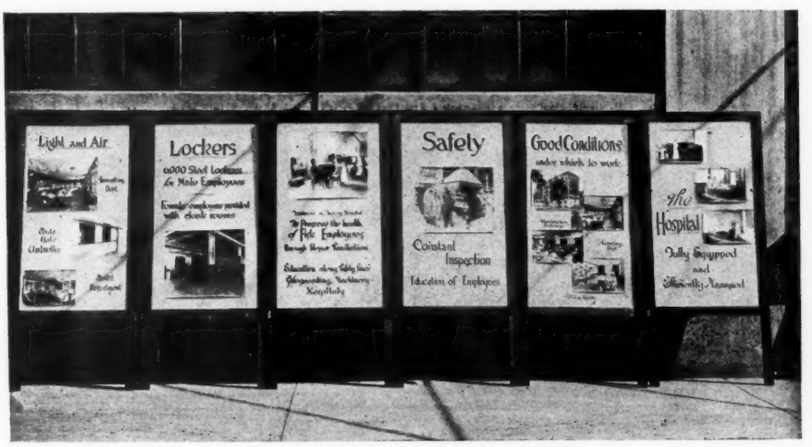
Women workers form but a small proportion of the Fisk organization; but they are taking an active part in Fisk activities. The special feature of the girls' work is the Fisk Unit of the Volunteer Clerical Corps. This is an organization which is helping the Government with the vast amount of detail work incident to registration and other new enterprises of the war. The Fisk girls have alphabetized and classified over 15,000 registration cards in Western Massachusetts and have sent delegates every evening to the Springfield (Mass.) Armory. The Armory is the manufacturing establishment of the army service rifle and the greatly increased production within the past few months has brought an added amount of detail work which called for outside help.

The Fisk Bulletin

An official weekly paper, called the *Fisk Bulletin*, is published by the Fisk Social and Athletic Assn. By means of the bulletin which spreads the news of what is being done, and by means of five directors, the association activities are carried out. The directors are elected and have executive power in running the association affairs. This power is subject to the check of popular approval.

What the Company Does

The activities described above are the work of the Fisk employees. These activities are encouraged by the company and are considered the best features in the recreational and health-building work of the factory. There are certain other activities of the factory which are not directly concerned with production, but which conserve the health of the employees and are therefore a legitimate part of the production expense.



Fisk Rubber Co.'s exhibit at West Springfield, Mass.

In the restaurant maintained by the company meals are served at cost

The food furnished the factory help is prepared in an up-to-date kitchen

The Fisk health department includes fourteen workers. The doctor in charge has been engaged in industrial health work for a number of years and prescribes proper working conditions to prevent illness. The questions of proper working temperature, adequate ventilation, the correct lighting facilities, and safety devices are looked into by the health department, and the factory follows its findings in the equipment of all the modern sanitary improvements which are provided, such as bubble drinking fountains, constant-flow washrooms, lockers and cloak rooms. Six thousand steel lockers are provided for the workmen and a cloak room is provided for the women employees.

There is an administration hospital where injuries may be treated immediately. The company employs a district nurse and gives her the use of an automobile, so that cases of illness may receive prompt and frequent attention. This effects not only more rapid recovery in case of illness, but prevents an epidemic in the case of contagious diseases.

Safety bulletins in different languages are posted up in all parts of the factory where there is danger; and a campaign of safety instruction is carried on all the time. The Fisk company is a member of the National Safety Alliance and uses the material prepared by that organization. A schedule of inspection for all the machinery is provided. Metal guards protect the worker from rotating parts of the machines.

Rest-rooms are provided for the girl workers, which may be used at the noon hours and at other times in case of illness. These rooms are fitted up in cheerful style, with comfortable lounges and chairs.

The factory provides a restaurant system where meals are furnished at cost to the workers. There is a cafeteria system for the girls at the office building, and a room where package lunches are served for the men in the factory. The restaurants furnish a good mid-day meal at a cost of 25 cents. This feature of the work is not as vital as in some communities, for the majority of the workers live in the community near the factory and in many cases can go home to lunch.

One more point deserves mention in the outside activities of the Fisk organization. All branches of the company and employees are aiming to do their bit for the Government. The girls, in addition to the volunteer corps, are active in Red Cross work. A number of the men are in the Second Massachusetts Regiment. The company has presented an ambulance to the second regiment, and the company with its employees subscribed $250,000 to the Liberty Loan.

Fageol Tractor Employs Grousers To Secure Traction

THE most distinctive feature in the Fageol tractor, manufactured by the Fageol Motors Co., Oakland, Cal., and illustrated above, is the method of securing traction by means of walking wheels fitted with sixteen U-shaped grousers 10 in. long on each wheel.

The tractor weighs 750 lb. and has a draw-bar pull of 4 hp. Transmission gears are inclosed and run in oil, and final drive is by internal gear. Speed is about 2½ m.p.h., plowing 4 acres per day, with a fuel consumption of 1½ to 1¾ gal. per acre.

The power plant is a four-cylinder, 3¾ by 5 in., with a float feed carbureter, equipped with a patent air washing device to keep the dust and dirt out of the engine.

Ignition is by high-tension magneto and transmission one speed forward and one reverse. Final drive is by means of pinion and internal drive gears. The drive wheels are 46 in. in diameter, with about 38 in. above the ground when in operation. The length over all of the tractor is 100 in. and width over all 41 in.

The tractor can turn in a radius of 7 ft., and uses kerosene, distillate or gasoline for fuel.

$700,000,000 Worth of Food Wasted Yearly in United States

Dr. Pearson Cautions Conservation and Urges More Intensive Production—Business Concerns Asked to Encourage Employees to Help with Harvest—Emphasizes Value of Home Gardens—Department of Agriculture Giving Special Attention to Standardizing and Marketing of Products

By Dr. Raymond A. Pearson
President of Iowa State College

¶ EDITOR'S NOTE—*"It is conservatively estimated that the value of the waste of food from American homes is not less than $700,000,000." This is a statement made by Dr. Pearson before the Editorial Conference of Business Papers, held in Washington. In emphasizing the necessity for conservation of food the Department of Agriculture is urging the establishment of gardens and the substitution of corn for wheat.*

SECRETARY HOUSTON telegraphed me asking if I could come here for an indefinite period to advise with and assist him on some of the questions connected with the Department of Agriculture.

I am going to try to tell you something about the Department of Agriculture; what it is doing in normal times, and, especially, what it is doing at the present time, and I shall say something also about the food situation.

In 1914 when the war broke out, we had an unusually large stock of food in the world; the crops of 1913 had been, perhaps, the largest in the history of the world; the crops of 1914 also were large, and 1915 was marked by large crops, especially in this country, some of them being bumper crops. In 1916, however, there was a reduction of crop yields throughout the entire world—in this country as elsewhere; and that was partly due to a shortage of labor, to a shortage of fertilizers, and largely due to climatic conditions. It resulted immediately in an increase of price of food products, and that, of course, is a point which has aroused the interest of the public very largely. Food prices have more than doubled in this country, and they have increased very greatly throughout the world.

Food Demand Inelastic

Let me remind you that the law of supply and demand, while it relates to food products as to other products, acts in a somewhat different way in connection with food products, because the demand for food is so inelastic. It has been pointed out by one of our economists that a man who is in the habit of paying fifty cents for a dinner is quite willing to pay one dollar for his dinner, if necessary; but, having had the dinner, he would not pay ten cents for another dinner. And so as the food supply falls off even slightly, it is felt in a very marked way, and its reaction is indicated in the prices; and, on the contrary, when there is a slight excess of food products, over the requirements, the bottom of the market may completely go out, and that has happened many times in many spots in this country where, for example, potatoes are a leading crop; many of these potato crops have never been dug because of a larger production than the demand for potatoes, and the fact that the price had gone out. So the fact that prices have doubled does not mean, by any means, that the supply of food has decreased correspondingly.

Foodstuffs Lead Our Exports

Now, as to our exports, the chief exports of this country are breadstuffs and meats, wheat, in the form of wheat and flour, and various meats, killed and alive. Our wheat and wheat equivalent exports previous to the war were running about 100,000,000 bushels per year. In the first year of the war they jumped to about 330,000,000 bushels, and in the next year they were 243,000,000 bushels, having fallen; and last year—the year now about to close—it is estimated that the exports of wheat will amount to only about 175,000,000 bushels—less than double the normal. Our exports of beef—I should say, meat including pork—constitute about 12 per cent of our production and have increased about 65 per cent since the war began.

Now, what about the prospects of food production, in the immediate future? I cannot do better than to give you just a few round numbers, taken from a monthly crop report issued by the Department of Agriculture. On May 1 of this year the area of wheat to be harvested in this country was reported as 28,000,000 acres, or 12,000,000 acres, 31 per cent less than the acreage planted last fall. The last winter was unusually hard on the wheat crop; in large areas in Nebraska 85 per cent of

the winter wheat has been killed; in other areas in the Middle West 100 per cent has been killed, or so nearly that the ground has been plowed up for other crops. So this year we have a smaller acreage of winter wheat by 31 per cent than last winter; and, furthermore, the average condition of that wheat for this year is 73 per cent, which is the lowest that has been reported for many years. A year ago it was about 84 per cent—the average condition of the wheat.

Now, that is a dark picture, but I want to say to you immediately that there is no special occasion for alarm. While wheat is our great bread crop, and we have learned to depend upon it, corn in this country is our king crop. Our normal corn yield is about three times the yield of wheat and, thus far, only about 10 per cent of the corn crop has gone into human food—and corn is as good a food as wheat, so there, you see, is one of our safety points. I am going to speak about that again in a few moments.

To Prevent Gambling in Food

Now, immediately when the food situation came to be known, Secretary Houston called in St. Louis a conference of the agricultural official representatives of the States from the Atlantic Coast to the Rocky Mountains, and a few days later a similar conference was held for the Pacific Coast States, and those men canvassed the entire situation. They made recommendations to the Secretary, and he has embodied those recommendations in a report to the Senate, and his recommendations are to-day under consideration in Congress, in the form of two bills—one relating particularly to measures to encourage the production of food, and the other relating particularly to measures for the control of food—especially to prevent improper speculation, cornering, and gambling in food products.

In each State now there is a special committee giving attention to this food question. As a rule, that committee is composed of the official agricultural representatives, including the officers of agricultural organizations—in some cases, the Governor—and those committees are co-operating with the Federal Department of Agriculture. Some States are entitled to high praise for the work they have done. New York State has arranged its committee and appropriated half a million dollars for them to work with. A few other States have made smaller appropriations. In most cases the legislature was not in session, so nothing special was done except to appoint a committee to work under such authority as might already obtain.

Output Must Be Increased

There has been a large response to the proclamations of the President and of Governors, and to the appeals issued by the Secretary of Agriculture, to increase food production. The great need of increasing our food production has been somewhat misunderstood in our country. It is not expected that the people of this country will suffer by starvation; but there is a great need on the part of our friendly European countries for our help, and every pound of food that we can produce here, or save here, will increase by that much what we may send to those people who truly are suffering, and some of them are perilously near the point of starvation. Gardens have been established by the million, and I am afraid some people are doomed to disappointment, where they have planted their potatoes under apple trees, trying to raise two crops on the same patch of ground, or where they have put in beans in country where anthracnose is known to attack every bean that shows its head above the ground. Yet there will be a large increase of food products on account of these voluntary efforts. Some manufacturing concerns—and I want to mention this to you particularly; most of you know it, doubtless—have arranged to facilitate this gardening movement among their employees, and we commend that effort most highly. Some of them have found the land, have plowed it, and even are arranging automobile transportation for squads of their employees to go out every day and attend to these gardens.

Now, we are emphasizing particularly the need of producing in the gardens foods that will be needed next winter—not radishes and lettuce, but substantial foods that will keep. We are emphasizing also the great importance of every community producing the food which that community will need for its own use. The Southern States are importing food, which they might now raise, from other sections of the country, to the extent of $600,000,000 in value annually. Now, that may be all right in normal times, but it is not right now, because every railroad car is needed for transporting products of importance to the war needs, and should not be required to transport products into sections of the country where those products might well be produced. So great emphasis is being given to the needs of producing the entire range of food products, as far as possible, within each locality; and, beyond that, an excess of transportable food that may be sent to other parts of the country, wherever necessary, and exported to the other countries.

Labor the Limiting Factor

The limiting factor in most sections on food production is labor. The Department of Agriculture has entered into a co-operative arrangement with the Department of Labor so that the two organizations, co-operating with railroads and others interested, have undertaken the great task of moving labor into sections of the country where it is most needed; but before that is done, everything possible is to be done to find local labor to fill the needs; and so an appeal has gone out to the seven hundred thousand retired farmers in this country, many of whom are well able to work, and who want to work. Special arrangements are under way now for placing on farms many thousands of college students and high school students who have had some training along that line, and are very useful, many of them being able to take the place of a man in farm work. On a stock farm it is necessary to have labor that has been trained

for that kind of work; they must have labor that can handle a four-horse team in the Middle West; they must have labor that can handle machinery; but on many of the truck farms and grain farms inexperienced labor is of value.

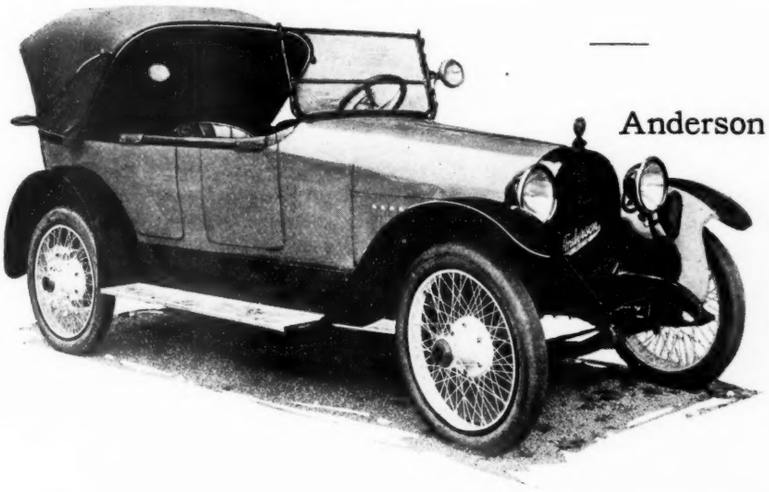
Now, the business concerns throughout the country have assisted by allowing their employees to take time off, agreeing in advance to do this; many of them are now booked in our labor offices to go out during the harvest time—the time of the peak of the load—and assist in getting in the crops. In one of the Western States some bank clerks have volunteered to work during harvest time three afternoons a week. That is not very much for them, but when a thousand of them have done that, it means the garnering of a large additional amount of the crops before they are injured by rain or weather. And so we are endeavoring to encourage that idea, and I want to emphasize it. We are asking the industrial concerns and business concerns of this country, in so far as their business will adapt itself to these needs, to encourage their help, especially the farm-raised help, to go out into the country during the peak of the load and assist the farmers; and a great many of our business men have done more than that; they have agreed to pay these laborers the difference in the wages, if there is a difference, between what the farmer can pay them and what they have been earning in the factory, or wherever they have been employed.

The other great point which the Department is emphasizing is the conservation of food. This country is notoriously a wasteful country. You know well enough that we have been wasting a billion cubic feet of natural gas a day for a great period of time, although that has been stopped now. We have been wasting the fertility of our ground in the same way. We are wasting bread; we are wasting food. It is conservatively estimated that the value of the waste of food from American homes is not less than $700,000,000 per year; two cents per capita per day. A slice of bread per home per day wasted means 1,500,000 barrels of flour in this country every year. The amount of butter wasted in our homes—one sixty-fourth of a pound a day wasted in each home, represents the production of 2,000,000 cows a year.

Food Aims Summarized

Now, to summarize, we are emphasizing the necessity for the substitution of corn for wheat, methods of saving our crops from insect depredation, and our animals and crops from animal and plant diseases, and the like; and, furthermore, the Department is giving special attention to the subject of standardizing and marketing our products, in order that the movement may be more direct from the producer to the consumer, and that unnecessary intermediate charges may be decreased or done away with.

There are many ways in which all the people can co-operate in these important lines of work.

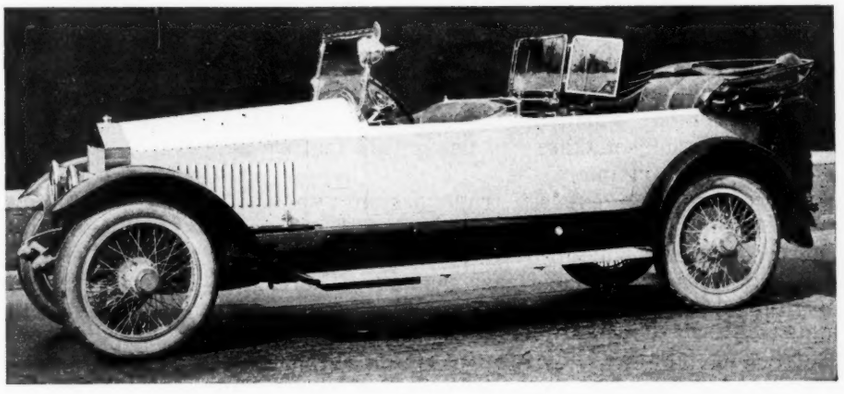


Anderson Fitted with Victoria Top

A NEW feature of the Anderson Six-40, manufactured by the Anderson Motor Co., Rock Hill, S. C., is the victoria top which the company is fitting on its 200-A and 200-C touring cars for $150 extra. This extra charge, of course, includes the conventional touring car top. The Anderson sells for $1,545 with the victoria top, as illustrated at the left.

Rubay Body on a Cadillac

THE special seven-passenger touring body illustrated at the right was built by J. O'Brien of Cleveland for the Rubay Co., of the same city. It is mounted on an eight-cylinder Cadillac chassis with 145-in. wheelbase. Two features which are distinctive in the car's appearance are the Rolls-Royce type hood and radiator and the tonneau windshield.



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Tractor Progress Marked

THE tractors exhibited at Fremont are a very different set of machines from those shown there a year ago. The general advance in engineering is very marked, and, although there remain many which are woefully poor jobs, the average is far higher. There are fewer real freaks and in details there is evidence of a settling down towards standard practice, as, for instance, a strong trend in the direction of the automobile type of front axle with knuckle ends instead of the centrally pivoted axle. There has been a great cleaning up of details on a good many tractors and inclosure and protecting of working parts has developed rapidly. It was stated in THE AUTOMOBILE AND AUTOMOTIVE INDUSTRIES not long ago that the inclosure of the pinion and bull gear on machines using this type of drive was very difficult, but though this is so there are several tractors at Fremont which are fully protected in this respect and their makers are using this feature as a strong sales argument.

There are fewer exposed transmissions; some of these originally open to all dirt and grit are now covered with sheet metal boxes and the majority are properly housed in strong cast casings. There are more machines with axle drive of the automobile or similar type, with a centrally placed differential. Engines have improved with the rest and in the same way—that is, by the consolidation of parts and removal of exposed detail.

On the whole, the kerosene burner outfits appear to be more likely to have a chance of working properly. Last year 90 per cent of the machines supposed to use the heavier fuel would do no better on it than the ordinary automobile which can always be made to run somehow on kerosene. Undoubtedly it has been realized that the kerosene problem must be tackled scientifically and that no chances can be taken. The four-cylinder engine is supreme, and usually of the highest speed type, though the big opposed twin cylinder outfits are still popular among the large manufacturers. On the whole there is much less change to be found in the machines produced by the implement firms than in those made by specialists, and some of the best engineering is seen in some of the least well-known tractors. This is a usual thing with a new industry and to judge from present indications the small firms are likely to be able to retain their lead for a good while yet. The longer they are allowed to do so by the conservative members of the industry the better will be their chance of reaping the reward which their activity deserves.

Gasoline Substitutes

A RECENT report from Washington conveyed the information that Congress had decided to give an inventor, who claimed to have tapped a new source of energy that would enable him to make a transatlantic flight without the use of fuel, a chance to prove his claims before a committee of five scientists. Such a report at the present time, when we are reminded of the growing scarcity of our supplies of liquid fuel not only by official reports from Washington, but now and then also by an increase in price by the gasoline dispensers, should arouse considerable interest. Unfortunately, through sad experience, we have become somewhat wary with respect to proposed radical solutions of the fuel problem. We remember some 3 years ago when a Portuguese chemist in Indianapolis announced that he had discovered a new fuel that could be produced at a next-to-nothing figure per gallon, and his claims were considerably bolstered up a little later when the names of several leading men in the automobile industry were mentioned in public announcements as having become financially interested in the invention. Great, therefore, was the disappointment when one of these men issued a statement to the effect that the new fuel production process was still in the experimental stage. In this stage it has apparently remained ever since, for aside from the name of the fuel, which was short and euphonious, little has ever been made known regarding it.

A little over a year ago the fuel problem seemed again solved, when a Long Island chemist was reported to have discovered a preparation in the form of a greenish liquid which when added to water in a very small proportion evolved a fuel on which an automobile could be driven. At least the inventor

convinced a newspaper reporter of the merits of his claims, and several glowing accounts of performance appeared in the papers at the time. But the news value of even such an amazing discovery declines rapidly; little further has been printed about this fuel now for a year.

A few such experiences tend to render the public somewhat skeptical with regard to new liquid fuels and new sources of energy in general. Besides this there is the law of the conservation of energy which is pretty well established. Of course, it would be foolish to maintain that crossing the ocean without fuel was an impossibility. Columbus and many others after him made the transatlantic voyage without bunkers full of coal. When a vessel is wholly surrounded by a uniform medium, as is the case with aircraft, the conditions are somewhat different than when it is partly surrounded by each of two media of different density; yet even in that case motion in this medium without the *direct* use of fuel might be possible.

It will undoubtedly be a wise plan not to attach too high expectations to the announcement from Washington. Something practical may develop from it, but in the light of experience with former similar announcements the chances are small.

Passing of the Differential Lock

AT an earlier period in the development of the motor truck, when side chains were the conventional means of transmitting the power to the driving wheels, it was quite common to employ a differential lock. This generally consisted of a positive clutch, or dog clutch, whereby the frame of the differential gear could be rendered rigid with one of the parts of the jackshaft. Usually the driver had to dismount from his seat to put the clutch into engagement and to disengage it.

With worm drive it is almost impossible to fit a differential lock of this type. It would have to be placed on the rear axle, and as the torque on the axle is several times as great as on the jackshaft it would have to be of very substantial construction and would add very considerably to the unsprung weight. A somewhat neater way than using a dog clutch on the differential would be to use hollow axle shafts containing within them a solid shaft that is fixed to one of the differential shafts and can be fixed to the other after removing the hub cap. But such a construction also greatly increases the unsprung weight, as the diameters of the differential shafts and the axle housing both must be enlarged.

The problem of loss of traction of truck wheels can be met by the use of anti-skidding devices on grips, and it has also been solved by the use of special forms of differentials which lock automatically when one wheel loses traction. These differentials in a way constitute the neatest solution of the problem, as they do not occupy any extra space, do not appreciably add to the weight of the axle—if at all—and are self-acting, hence cause no delay. There has been considerable development of such differentials in recent years, and as the old-time differential lock has practically disappeared, we may expect further progress along this line. It is hard to conceive of a line of work in which an effective self-locking differential is so necessary as in military transport, and it is possible that the war may bring this type of differential to the front in motor truck work.

Must Aluminum Cylinders Have Liners?

WHEN the price of aluminum becomes normal again we shall undoubtedly hear a great deal more about aluminum engines. The one direction in which there seems promise of considerable improvement in automobile design is that of reduced weight. To carry two people of an average total weight of 300 lb., the minimum car weight required is now not much under a ton, and the average moderately well powered roadster weighs a good deal more. This is certainly a very low efficiency, as less than 15 per cent of the total weight moved is useful load.

In trying to reduce the weight of a car there could be no better starting point than in the engine. Not only is this the heaviest individual part, but a reduction in engine weight will permit of savings in weight in many other parts, such as the frame, springs, wheels, etc., because these parts have less to carry.

It is true that recently the tendency has been rather away from aluminum than toward it, as many of the lower-priced cars now have crankcases and transmission cases of cast iron. This, however, is entirely a matter of price. When normal times return there is no reason why aluminum should not go back to its old price and possibly fall below it. Of course, if it is necessary to fit the cylinders of an aluminum engine with removable liners, the additional machine work required will be a handicap.

But are cast iron liners really necessary? It would seem that if an aluminum alloy having bearing properties, like those used for pistons, were used, the requisite durability might be obtained without liners. For instance, with cast iron pistons in aluminum cylinders the wear on the cylinder walls certainly would be less than the wear on an aluminum piston in a cast iron cylinder. Piston pin bearings directly on the aluminum of the piston bosses are now successfully used and the maximum unit pressure on these bearings is a great many times larger than the maximum unit pressure on the cylinder walls, though the surface speed, of course, is materially less. The use of cast iron pistons is here mentioned because with them in an aluminum cylinder we have exactly the same bearing conditions as with aluminum pistons in a cast iron cylinder. But as cast iron on cast iron has good bearing properties it is not improbable that aluminum on aluminum (alloy of the magnalium type) would give satisfactory results.

At any rate, the use of aluminum in the cylinder would have the advantage of permitting of slightly reducing the piston clearance, thus minimizing the tendency to piston slap.

News of the Automotive Industries

War Tax Bill Is in Senate

Motorcycle, Automobile and Motor Boat Revenue Plans Changed

WASHINGTON, Aug. 6—The Finance Committee has favorably reported the $2,000,000,000 revenue bill or War Tax bill to the Senate to-day. The proposed license tax on motorcycles and automobiles, based upon the original selling cost, in lieu of the House manufacturers' tax, was explained as follows:

"A gross tax upon automobile manufacturers was first considered, but on thorough investigation it appeared that over 80 per cent were making very small profits.

"Your committee concluded that the automobile was a proper subject for a war revenue tax and recommends for the high gross sales tax, which might or might not be passed on to the purchaser, a moderate excise tax upon the owners of automobiles and motorcycles."

Plan of Taxation

According to the latest plans of taxation, motorcycles and automobiles will be taxed at the time of the original purchase and thereafter on July 1 in each year as follows: Motorcycles, $2.50; automobiles the original listed retail price of which is not over $500, $5; original listed retail price over $500 and not over $750, $7.50; original listed retail price over $750 and not over $1,000, $10, and for each further increase of $500 or fractional part thereof of original listed retail price, an additional tax of $5.

In the case of a tax imposed at the time of the original purchase of a new automobile or motorcycle on any other date than July 1, the amount to be paid shall be the same number of twelfths of the amount of the tax as the number of calendar months, including the month of sale, remaining prior to the following July 1.

The tax payable in any year shall be reduced by 10 per cent of its basic amount for each 12 months elapsed since the original sale of the automobile or motorcycle by the manufacturer or importer, but in no case shall it be reduced to less than 50 per cent of such basic amount.

The use of yachts, pleasure boats, power boats, of over 5 net tons, and motor boats with fixed engines, not used exclusively for trade or national defense, or not built according to plans and specifications approved by the Navy Department, are to be taxed. An excise tax will be based on each yacht or boat, at rates as follows: 50 cents for each foot; length over 50 ft. and not over 100 ft., $1 for each foot; length over 100 ft., $2 for each foot; motor boats of not over 5 net tons with fixed engines, $5.

In the case of a tax imposed at the time of the original purchase of a new boat on any other date than July 1, the amount to be paid shall be the same number of twelfths of the amount of the tax as the number of calendar months, including the month of sale, remaining prior to the following July 1.

—

Navy Drops Submarine Chaser Construction

WASHINGTON, Aug. 6—The manufacture of submarine chasers for the Navy Department is to be dropped, according to reports of a statement by Secretary Daniels. The Navy General Board has recommended the placing of no more contracts for submarine chasers, but to build all the destroyers possible. Several hundred 110-ft. chasers were ordered originally, and these are now being delivered. These boats have been found serviceable for rivers and harbors, but are faulty in sea service.

Intimations came from diplomatic quarters to-day that naval experts of the Allies probably would undertake to demonstrate to the American Navy Department the wisdom of continuing on an extensive scale the building of submarine chasers.

—

$80 Increase on Maxwell Cars

DETROIT, Aug. 6—The Maxwell Motor Co. will increase the prices of the touring cars and roadsters from $665 to $745 beginning to-day.

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Cole Prices Higher Sept. 1

INDIANAPOLIS, Aug. 7—The Cole Motor Car Co. will raise its prices Sept. 1 at least $200.

—

Grant Price $75 Higher

CLEVELAND, Aug. 6—The Grant Motor Car Corp. has increased the price of its car from $875 to $950, effective Aug. 1.

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Chevrolet Panel Delivery Higher

DETROIT, Aug. 6—Chevrolet panel delivery cars have been increased by the Chevrolet Motor Co. from $640 to $740.

—

Detroit Products Adds Ford Sedan

DETROIT, Aug. 8—The Detroit Auto Products Co. has added the manufacture of a special Ford Sedan body.

Goodyear Plant in Brazil

13-Acre Site Selected in Rio de Janeiro to Fill Government Contracts

RIO DE JANEIRO, BRAZIL, Aug. 6—The Goodyear Tire & Rubber Co. of South America has purchased in the neighborhood of this city known as Gavea, on Rua Marquez de S. Vicente, approximately 13 acres of land on which a rubber factory is to be built.

It is stated that the plant is to be built to manufacture articles enumerated in the company's contract with the Government, which includes rubber goods, copper wire for insulating canvas and other cotton fabrics for use in making tires and other products.

The plant will be in operation within 15 months after the plans are approved.

—

Purchasing Program Well Under Way

WASHINGTON, Aug. 7—The newly created war industries board is now well started on its big purchasing program for the United States and her allies, the board having met this week with the President to receive final instructions. Among the first problems to face the board will be the task of co-ordinating American and Allied purchases. Bernard M. Baruch is to be named purchasing commissioner for each allied government and chairman of the war industries board's purchasing commission for the American Government.

Trouble is being predicted for the purchasing board when it seeks to buy for the Allied governments at the same low prices made to the United States Government by American manufacturers.

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Electric Auto-Lite Notes Sold

NEW YORK, Aug. 8—The National City Co. has purchased $5,000,000, 6 per cent secured gold notes of the Electric Auto-Lite Co. maturing in 1 and 2 years. Of the total issue $2,000,000 will mature in 1 year, $3,000,000 in 2 years. The former will be offered at 99¼ and interest to yield over 7 per cent. The notes will be secured by specific pledge of collateral valued at over $17,000,000 and consisting of the common stock of the Willys-Overland Co., Fisk Rubber Co., 7 per cent secured preferred stock and Federal Rubber Co. 7 per cent second preferred stock.

Its net income for the first 6 months of 1917 was $1,703,222.

Standard Steel for Aircraft

Uniform Parts Next—To Hasten Construction—Next Meeting at Washington

NEW YORK, Aug. 8—A definite decision has been reached by the International Aircraft Committee as to the kind of steel to be used in making airplane parts. This committee, which will standardize specifications for metals used in making airplanes, will hold a meeting in Washington next Tuesday to further standardize matters.

Uniform Specifications

Final agreement as to uniform specifications of the parts was not reached to-day and the Washington meeting is one of other weekly meetings which will be held until the work is finished.

Those present were: F. G. Diffin, chairman, representing the United States Government; A. B. Rogers and S. G. Payne, C. E., representing Great Britain; Captain Alexander Pomilio and Dr. McGregor, representing Italy; Captains Jean Herck and D. E. Chanvalon and Lieutenant M. Mignot, representing France; Friehof G. Ericson, representing Great Britain; George L. Norris, representing the United States Signal Service, Aircraft Engineering Division; Dr. George K. Burgess, representing the United States, Bureau of Standards, and K. W. Zimmerschied of the United States Aircraft Standardization Committee.

Patent Agreement Attacked

The recent consolidation of aircraft manufacturers, headed by the Wright & Curtiss interests, under the title of the Manufacturers' Aircraft Corp., was attacked to-day by Leon Cammen, vice-president of the Aeronautical Society of America, who claimed that it was an effort to throttle the industry and to freeze out the future inventors. The agreement between present aircraft makers provides for cross-licensing of patents between the companies now entering the combination. Any future inventor may come into the organization providing he submits his inventions to a board of arbitration which will adjudge what he is to get for it. Mr. Cammen believes that this would destroy all incentive for invention.

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Wolverine Speedway Special Sells for $3,000

KALAMAZOO, MICH., Aug. 7—The Wolverine Motors, recently formed to build high grade sport cars, has brought out the Speedway Special, selling at approximately $3,000 and intended to meet the demands of the amateur sportsman. The Speedway Special will be built on a 115-in. chassis. The engine will be a four, under 300 cub. in. displacement, and will have a maximum speed of 75 hp., guaranteed. A large amount of aluminum will be used to cut down the weight. The standard gear ratio is 2.94 to 1.

The radiator is a special racing V type, copper core. The axles used are the product of the American Ball Bearing Co. Other features include wire wheels, equipped with 33 by 5 cord tires.

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Lelands Buy Rands Factory

DETROIT, Aug. 6—Henry M. Leland and his son, W. C. Leland, have purchased the plant formerly occupied by the Rands Mfg. Co., and will use it for airplane manufacture for the government. Definite announcement with regard to the plant and future plans will be made shortly.

—

New Moon Model Six at $1,000

ST. LOUIS, MO., Aug. 6—The Moon Light Weight Six is announced by the Moon Motor Car Co. The car will be put on the market in the very near future and will sell for $1,000. The weight is given as 2350 lb., and it will have 38 by 3½ tires and the Continental engine will be 3 by 4½. The body will be of the latest design of high radiator and low windshield.

The Moon company is arranging for a production of 5000 of this car annually, and has acquired title to a city block already equipped with factory buildings adjoining the main plant at Main and Cornelia Streets. The machinery for the new buildings has been bought and will be installed at once.

—

No Mechanical Changes in 1918 Stearns

CLEVELAND, Aug. 3—The F. B. Stearns Co. has announced its 1918 models. Next year's chassis will be unchanged from the 1917 design, the only changes being those in the bodies and prices. The new body design on the open type is straight line with divided front seats. The 1918 models have been raised in price. The five-passenger four will sell for $1,585; the touring car for seven at $1,725; the Cloverleaf roadster, $1,585; the coupe, $2,150; limousine, $3,000; landaulet, $3,100; landaulet brougham, $3,200.

The seven passenger touring eight sells for $2,375; Cloverleaf roadster, $2,375; coupe, $3,075; limousine, $3,685; landaulet, $3,785; and landaulet brougham, $3,785.

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Shadburne Bros. to Manufacture the Dixie-Flyer

CHICAGO, Aug. 5—Shadburne Bros. Co. has taken over the Dixie Motor Car Co., Louisville, Ky., manufacturer of the Dixie-Flyer. The Dixie-Flyer will be made at the new Shadburne plant just completed at Frankfort, Ind.

Regular production on the Shad-Wyck will begin during the present month.

The company recently purchased the Bour-Davis Co., Detroit. The entire plant equipment was moved from Detroit to Frankfort and production is now under way.

Plan Airplane Plant for Navy

To Cost $1,000,000 and Be Located at Philadelphia Navy Yard—5000 First Year

WASHINGTON, Aug. 7—The Navy will build an airplane plant costing $1,000,000 at the Philadelphia Navy Yard on League Island. The factory will begin operations within 100 days and will have a capacity of 1000 planes a year. The army program contemplates 25,000 airplanes the first year.

—

Aero Plant for Atlantic City

ATLANTIC CITY, N. J., Aug. 6—An airplane plant will be constructed in this city for the production of mechanical parts of hydroairplanes for war service in France. A government school will be established. The plant will also serve as the exclusive repair shop for all hydroairplanes used on the American coast. It also will be the official central establishment for the Coast Defense Flying Corps.

—

Fifty Wright-Martin Engines Daily

NEW YORK, Aug. 8—Negotiations are pending between the Government and the Wright-Martin Aircraft Corp. whereby the latter's output of airplane engines will be increased from four to fifty a day. The Government, it is stated, will advance the company $10,000,000 working capital to take care of this production.

—

Eight More Engineers Working on Standard Army Truck

WASHINGTON, Aug. 6—Eight more engineers are aiding the Government to complete the design of standard military trucks in addition to the list appearing in THE AUTOMOBILE AND AUTOMOTIVE INDUSTRIES last week. They are:

Carl Clement, Bock Bearing Co., Toledo.
Wm. W. Peck, Muncie Gear Works, Muncie, Ind.
J. D. Harris, McCord Mfg. Co., Detroit.
Alvina Gloetzner, Covert Gear Co., Detroit.
G. C. Hart, Brown-Lipe Gear Co., Syracuse, N. Y.
A. W. Copland, Detroit Gear & Machine Co., Detroit.
S. O. White, Warner Gear Co., Muncie, Ind.
K. W. Hooth, Fuller & Sons Mfg. Co.

The transmission is rapidly approaching completion and the first layouts for the engine are well under way.

—

Utz on Military Truck Board

CLEVELAND, Aug. 6—John G. Utz, director of engineering for the Standard Parts Co. and chairman of the standards committee of the Society of Automotive Engineers, has been ordered to appear in Washington to serve on the military board for the standardization of motor trucks. He will be the engineer in charge of designing trucks for the quartermaster's department.

Standard Parts In Merger

Will Take Over American Ball Bearing Co., According To Present Plans

CLEVELAND, Aug. 6—It is reported by reliable sources that the American Ball Bearing Co. of this city is completing the details of a plan whereby the company will merge with the Standard Parts Co.

—

$360,359 Standard Parts Earnings

CLEVELAND, Aug. 6—Net earnings of the Standard Parts Co. in June amounted to $360,359.39. For the first 6 months of the company's operations, the period ended June 30 last, net earnings were $1,994,793.02, or at the annual rate of about 30 per cent on common stock. These figures are after liberal depreciation charges, but before deduction for excess profits taxes.

—

Export Gasoline and Kerosene Higher

NEW YORK, Aug. 7—The Standard Oil Co. of New York has advanced the price of gasoline and kerosene for export ½-cent a gal.

The Prairie Pipe Line Co., the Texas Co. and the other big purchasers of crude oil in the Mid-Continent field, it is expected, will meet the advance of 15 cents a barrel, made by the Sinclair Oil & Refining Co., last week. The Oklahoma Producing & Refining Co. and one or two other independents have already met this increase and are now paying $12.85 per barrel.

Gasoline exports during the 11 months ending June 30 were 202,114,913 gal., compared with 2,220,211,439 in the corresponding period in 1916. Gasoline for export has risen in price from 10.7 cents per gallon in June, 1915, to 21.6 cents in May last.

—

Maine Has New Headlight Law

AUGUSTA, ME., Aug. 4—The Governor and council have passed a new lighting law which will go into effect on Aug. 15. It aims to solve the headlight glare, and in some respects it is an improvement on laws in other States, for it limits the candle-power of bulbs to 24. In other States with such laws the power is unlimited, the devices put on do not work well when high powered bulbs are used. The new law applies to motor vehicles and electric railway cars. The regulations allow the use of various devices like Fracto, Warner Legalite, Osgood, Conophore with clear glass, etc., but lenses of colored glass are prohibited. Ground glass or lenses with bon ami may be used. Spotlights are on trial, and if they are misused this summer they will be abolished altogether later, the law states. It was to have gone into effect Aug. 1, but the officials decided to allow the motorists some leeway, particularly those from other States.

—

Commercial Failures Lower Than 2 Previous Years

NEW YORK, Aug. 4—Fewer commercial failures occurred during June, according to *Dun's Review*, than in the same period of either of the 2 years immediately preceding, while the liabilities, excepting those of 1916, were the smallest since 1912.

The Canadian failures for the second quarter of 1917 were far smaller than those in the corresponding period of 1916. Manufacturing defaults show a reduction in number of forty-six, from 105 to 59, and the liabilities fell from $2,757,401 to $1,725,839.

Monetary movements have mainly tended in borrowers' favor, and the rates contrast sharply with those witnessed before the turn of the half year. As against a ruling charge of 6 per cent on call loans little more than a fortnight ago, only 2½ per cent has been the prevailing figure.

The bank surplus on July 21 last was at the highest level. Because of the lowering of reserve requirements, the local Clearing House institutions last Saturday reported an enormous expansion of over $173,000,000 in the actual surplus. This raised the total to approximately $279,000,000, the highest on record. Loans disclosed a decrease of $30,000,000, and the aggregate reserve showed a further gain of about $84,300,000.

Bank clearings this week at leading centers again reach record figures for the period, the total amounting to $5,329,935,708, an increase of 19.5 per cent as compared with the same week last year.

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FERGUSON WITH AUTOMOBILE AND AUTOMOTIVE INDUSTRIES

NEW YORK, Aug. 7—C. O. Ferguson, formerly with the Advance Felt Specialty & Cutting Co., Chicago, has been made circulation manager for the Class Journal Co., which publishes THE AUTOMOBILE and AUTOMOTIVE INDUSTRIES, *Motor World* and *Motor Age*. Before his connection with the Advance Felt Company, Mr. Ferguson was circulation manager of *Motor Age*.

—

ELECTIONS

NEW YORK, July 31—At the annual meeting of the stockholders of the Keystone Tire & Rubber Co. the following were elected directors: Joel Jacobs, L. Waler Lissberger, M. J. Miller, of Miller & Co.; H. H. Jacobs and Sidney Bernheim.

—

French War Order for White

CLEVELAND, Aug. 6—The White Motor Co. has an order from the French Government for 1500 trucks, in addition to large orders from the United States Government, and can operate at full capacity for the next 18 months on orders now on hand.

Goodyear June Sales $11,601,200

Net Business Is $5,322,200 More Than in June of Last Year

AKRON, Aug. 6—The net sales of the Goodyear Tire & Rubber Co. for June of this year amounted to $11,601,200 as compared with $6,279,000 for June of 1916. Net profits are not yet available but are known to be far in excess of last year. The net profits for the first 6 months of the current fiscal year ended April 30 were $5,379,112, against $7,003,330 for the whole preceding fiscal year. The 6 months' earnings were at the annual rate of 46 per cent on the common stock.

—

Pierce-Arrow Earns $6.66 a Share on Common

NEW YORK, Aug. 3—The Pierce-Arrow Motor Car Co. has issued to stockholders the following statement of operating results for the 3 months and for the 6 months ending June 3, 1917:

	3 mos. end. June 30, 1917	6 mos. end. June 30, 1917
Net operating profits	$1,303,376	$2,317,562
Interest	9,786	15,964
Depreciation	117,333	234,665
Surplus	$1,176,257	*$2,066,932

*Equivalent to $6.66 a share earned during the 6 months' period on 250,000 shares of common stock after allowing for dividend requirements on the preferred stock.

The above figures make provision for all taxes to which the company is now subject, excepting the excess profits tax and other taxes now under consideration by Congress but not yet become law.

—

Akimoff Organizes Dynamic Balancing Laboratory

PHILADELPHIA, Aug. 4—N. W. Akimoff, inventor of several advanced types of dynamic balancing machines, is organizing a special dynamic balancing laboratory here. Its primary object will be to serve for demonstration purposes and acceptance tests, although Mr. Akimoff is also planning to handle a limited amount of outside work in connection with the dynamic balancing of shafts, etc. Such work is done on his own machines and under his personal supervision.

—

Anglide Takes Over Mon-Auto Manufacture

INDIANAPOLIS, Aug. 5—The Anglide Scale Co., Elkhart, Ind., will in the future manufacture the product of the Gibson Mon-Auto Co., New York. The Mon-Auto is a device attached to bicycles to convert them into motorcycles—a single cylinder four-cycle engine with clutch and brake all operated by a single control. The device weighs 50 lb.

Studebaker Cuts Dividend

Common Reduced from 10 to 4 Per Cent Basis—$55,400,000 Assets

NEW YORK, Aug. 8—The directors of the Studebaker Corp. have declared the regular dividend of 1¾ per cent on the preferred stock, and 1 per cent on the common. The dividends are payable Sept. 1 to stock of record Aug. 20. The common has heretofore paid 10 per cent.

A. R. Erskine, president of the Studebaker Corp., makes the following statement: "The net profits of the corporation for the first 6 months of this year amounted to $2,966,198, after deduction for existing corporation income taxes but without provision for excess profit taxes about to be enacted by Congress.

"The directors feel constrained to reduce the dividend on the common stock on account of the uncertainties of the future and the consequent necessity of conserving working capital.

"The sales of automobiles in the first quarter of this year exceeded those of any previous similar quarter, but upon the entrance of our country into the war the sales declined, and our second quarter was unsatisfactory.

"Factory production schedule was changed in May to conform with the reduced volume of business, and we are now operating on a 65 per cent schedule as compared with last year. The effect of reduced volume in quantity production increases overhead costs, and when coupled with the existing high cost of materials and labor is damaging to the profits of the business. Since July 1 sales of cars have improved and the present demand is for about 1000 cars per week.

Government Orders

"The regular business in the vehicle division for the first 6 months was excellent, and promises to continue heavy throughout the year. In addition thereto we have received orders from the Government for large quantities of escort wagons, ambulances, drinking wagons, harness, etc., with the result that our vehicle factories will operate to the limit of their capacity as far as the next year.

"The condensed balance sheet of the corporation and subsidiary companies as of June 30, 1917, shows total tangible assets of $55,400,000, including $41,100,000 of quick assets and $14,300,000 of plant and company account, against which stands $15,900,000 of liabilities, including $13,200,000 of bank loans. Since June 30 outstanding bank loans have been reduced to less than $11,000,000.

"The total tangible assets of the corporation are greater than ever in its history, while its bank loans are no more than they have been several times in previous years.

"The extensive manufacturing operations of last winter, including the accumulation of large stocks of raw materials brought into the factories to safeguard against shortages and transportation difficulties, and followed later by substantial purchases of steel and lumber on account of Government orders, explain the existence of the large inventories shown on the balance sheet.

"However, the surplus inventories are now in process of liquidation, which will bring them back to a normal basis before the end of the year. It has turned out fortunately for our customers that our purchases of materials at prices prevailing last year have enabled us to keep our prices down to a low basis. Our existing stock of finished cars covers less than 6 weeks' requirements, and the management expects to encounter no difficulty in marketing these cars, together with those yet to be manufactured to complete the production schedules for the balance of the year. In fact, present indications are that there will be a shortage of Studebaker cars during the forthcoming winter months."

Consolidated balance sheet of the Studebaker Corp. as of June 30, 1917, compares with statements as of Dec. 31, 1916 and 1915, as follows:

ASSETS

	June 30, '17	Dec. 31, '16	Dec. 31, '15
Cash	$2,786,218	$3,196,703	$5,910,062
Investments	1,131,770	1,142,045	1,570,093
Receivables	11,834,525	9,428,391	8,585,199
Inventories	25,030,316	21,477,657	13,062,041
Def. charges	340,772	235,493	161,445
Plant & prop.	14,272,011	13,437,983	12,400,493
Trade name, good will, etc.	19,807,277	19,807,277	19,801,277
Total	$75,202,890	$68,725,549	$61,496,617

LIABILITIES

Pref. stock	$10,965,000	$10,965,000	$10,965,000
Com. stock	30,000,000	30,000,000	30,000,000
5% gold notes	.....	.....	2,305,500
Notes pay'ble	13,231,500	4,000,000	.....
Acts. pay'ble	952,614	3,542,886	2,770,057
Deposits on contracts	299,929	342,111	504,895
Reserve for rebates	873,354	689,320	541,464
Sundry creditors, etc.	576,530	1,964,694	1,890,095
Contingency reserves	1,358,237	1,358,237	1,500,000
Special surplus acc't	2,548,654	2,548,654	2,548,654
Surplus	14,397,071	13,314,647	8,470,952
Total	$75,202,890	$68,725,549	$61,496,617

DIVIDENDS DECLARED

B. F. Goodrich Co., 1¾ per cent on preferred, payable Oct. 1 to stock of record Sept. 21. Also 1 per cent on common, payable Nov. 15 to stock of record Nov. 5.

$50,000 Rubber Products Stock Divided

BARBERTON, OHIO, Aug. 6—The Rubber Products Co. of this city has voted a $50,000 stock dividend to shareholders who will receive one share of the new stock for each nine now held. The $500,000 stock authorized will then be all outstanding. A stockholders' meeting is called for Sept. 6 to increase authorized stock to $1.000,000 of which new stock $150,000 will be offered to stockholders at par and the other $350,000 will remain in the treasury.

CAPITAL CHANGES

Rush Motor Truck Co., Philadelphia, from $500,000 to $2,000,000.

Overland Sales $13,611,775

$2,500,000 Increase Over July, 1916—16,572 Cars Sold—Shipments Increase

TOLEDO, Aug. 7—The Willys-Overland Co. sales record in July amounted to $13,611,775, an increase of $2,500,000 over the company's previous high record, which was established in June of this year. July, therefore, was the biggest month, from the standpoint of retail sales, in all the history of Willys-Overland, Inc. Willys-Overland branches, distributers and dealers reported sales of 16,572 cars during July. Although working at top speed, the Toledo factory has been unable to maintain pace with sales. During July, 2500 more cars were shipped than in July, 1916. The total shipments for the year to date are also in excess of the shipments for the same period in 1916.

Overland in Control of Curtiss

TOLEDO, Aug. 4—Willys-Overland interests have obtained control of the Curtiss Aeroplane and Motors Co. All the stock in the airplane company is held in a voting trust. The two companies have been practically allied ever since the formation of the Curtiss company in January, 1916, and it now has the same officials and board of directors as the Willys-Overland Co.

C. M. Keys of New York has resigned as one of the three voting trustees. J. E. Kepperley, vice-president of the Willys-Overland Co., was immediately elected to succeed him.

Goodyear Tests Tires for Ability to Resist Bullets

AKRON, Aug. 7—The Goodyear Tire & Rubber Co. has recently held a number of tests at the Northwestern Military and Naval Academy, Lake Geneva, Wis., to ascertain the resistance of its tires to flying bullets. An armored car owned by the Academy was mounted on Goodyear cord tires and used as a target. All shots were fired from within 50 yd. of the wheels, the desire being to secure the maximum velocity of the projectile. From the results of the tests, the Goodyear company believes that under normal field conditions fully 90 per cent of the shots meeting a tire would not puncture it and that cord tires, owing to their resiliency and speed possibilities are more feasible for military work than solids.

Trustee for Kent Motors

NEWARK, N. J., Aug. 3—Louis G. Beekman, receiver for the Kent Motors Corp. of New Jersey, has been appointed trustee of the Delaware concern of the same name. The sale of the plant of the Kent Motors Corp. in Belleville, N. J., set for this week, has been postponed for 3 weeks.

Industrial Review of the Week

A Summary of Major Developments in Other Fields

NEW YORK, Aug. 8—Industrial conditions throughout the United States are from fair to excellent, depending upon the industry and the section of the country involved. *The Federal Reserve Bulletin* summarizing business conditions up to the latter part of July indicates that foreign trade is holding good. Reports from the various business papers in the country indicate that the chief business activity is along Government lines. The main arteries of trade are pouring their products into ships, munitions, and supplies for the army and navy. The workers in the war industries must also represent a large consumption and their demand is an added stimulus to trade. A number of business journals on being asked for the significant facts in their lines reported in substance as follows:

Await Government Steel Prices

Repeated outgivings from Washington of sweeping action intended in the Government's dealings with steel makers and the reiteration of the President's call for "one price for all" have only added to the uncertainty that is holding back all iron and steel markets. Price changes have been narrow, apart from semi-finished steel, in which offerings have been made at $10 to $15 a ton below the recent high level of $100 for billets and $105 for sheet bars.

It is known that buying for the Allies is held up by the steel cost inquiry and that more time will be necessary for the latter than was counted on. The suggested commandeering of plants charging more to private consumers than to the Government might not be easily applied to 400 blast furnaces, only a few of which by any chance would be sellers to the Government.

The withdrawal of cars from the coke districts in view of labor scarcity was overdone this week and spot coke advanced $3 to $4 a ton or to $13 and $14.

The limiting of export licenses for plates and various other products to material for war purposes will result in some resale transactions, though there has been no great amount so far. Japan has taken 50 per cent of plate exports in recent months, and has large orders on the books of the plate mills, on some of which rollings may be held up indefinitely. —*Iron Age.*

Coal Situation Good

Coal production has been stimulated as a result of the interest recently taken by the railroads in the industry. The bituminous coal shortage is really always a car shortage rather than a coal shortage. As a result, now that the railroads have been doing better, the tonnage has increased about 25 per cent. In some parts of the country there are plenty of cars, and in others men are still working between one-half and three-quarter time. In the anthracite region the miners and other laborers have been working far more regularly than ever before and for longer hours. Consequently, despite the decrease in the number of miners and in the length of the working day of the day hands the tonnage has increased about the same as in the bituminous region.

In the anthracite region the miners are proposing to secure a conference with the operators for the purpose of obtaining a closed shop. This would be a modification of the present contract, While no strike is proposed to secure this modification, at the same time the operators know what to expect. Several local strikes were recently enforced to compel non-union men to affiliate with the union. The United Mine Workers of America are edeavoring to strengthen their position in non-union fields, such as part of Kentucky, Tennessee, Alabama, and Colorado; and in the Johnstown and Greensburg fields in western Pennsylvania. It is feared that local strikes may break out and consequent coal shortage for certain sections at least will result.

There is a disposition in some quarters to desire that the price of coal as agreed upon with the Government be taken to apply to the price at the tipple rather than at the railroad. Such an arrangement would permit the continuance of the "wagon" mines, or mines located at a distance from railroad connections which were recently opened up due to the recent high prices and shortage of coal. At the new price the hauling costs are so high that these mines cannot operate profitably.—*Coal Age.*

A New Service

¶This week THE AUTOMOBILE AND AUTOMOTIVE INDUSTRIES *is able to supply for the benefit of its readers a general summary of important developments in other fields of business. This is rendered possible by the editorial cooperation of leading industrial publications which are recognized authorities.*

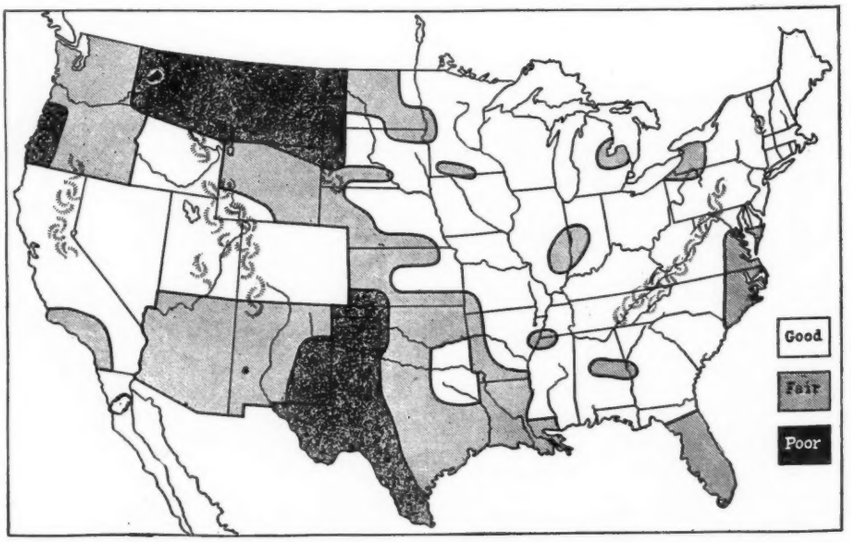
By compressing the general industrial situation into this form we hope to give our readers a clear and comprehensive idea of up-to-the-minute developments which they could otherwise secure only with considerable expenditure of time and effort.

Machinery World on War Work

The machinery world is centering its attention on the airplane field. The various machine shops are developing apparatus for making airplane parts. Then munitions manufacture has also been stimulated by the entrance of the United States into the war. One of the highest tributes to the machinery world was the appointment of Frank Scott, general manager of the Warner & Swasey Co., to be chairman of the war industries committee.—*American Machinist.*

Rubber Trade Needs Cotton

The rubber industry is like others in the respect that parts of it are engaged in war orders and the other parts are somewhat dull. The general situation is greatly improved. The raw materials situation is not serious. There is a great deal of crude rubber; the only difficulty



Map prepared by the Committee on Statistics and Standards, Chamber of Commerce of the United States, showing general conditions of crops and business on July 21

is in getting it from the far East. But the shipping situation is also improved. The industry has been vastly stimulated recently by the Government orders. The manufacture of ground sheets, footwear, rubberized fabric and other products for army and navy use has made a great demand on the industry. The chief shortage is in long staple cotton used in the manufacture of automobile tires. The Sea Island cotton has never been raised in sufficient quantities to supply the trade, and the Egyptian cotton has been embargoed by the British Government.—*India Rubber World.*

Railroad Business Gains

Record prosperity has been enjoyed by the railroads recently, according to the report of the Interstate Commerce Commission just published. The net revenue for 153 lines during June was $88,283,329, a 10 per cent gain over June, 1916. Operating expenses have increased $30,000,000 over June of last year, but the operating revenues were $38,000,000 greater than in June, 1916. The gross income for June was $273,867,527.

The latest developments of greatest importance to the railroad world are the proposed addition to the membership of the Interstate Commerce Commission which will make it a board of nine men rather than seven; and the creation of a priority board to determine which products shall be transported first. This means that the railroads will have to take goods for shipments in accordance with Government orders rather than dealing with the individual shipper.—*Railway Age Gazette.*

Industrial Building Booming

Three major industrial building projects have been authorized recently, and are being gotten under way. These are the Curtiss company plant at Buffalo, N. Y., the United States Steel shipbuilding plant on the Newark meadows, and the Government owned airplane plant at League Island, Pa. The two airplane plants are each $1,000,000 projects, and the shipbuilding construction will embrace 12 or 15 buildings of various dimensions. The industrial building trade has been immensely stimulated by the war.—*F. W. Dodge Construction Reports.*

Shortage of Power Machinery

There is a great increase in the demand for power machinery with a consequent shortage in supply. It is almost impossible to get boilers and engines, due to the difficulty of getting steel. The creation of a priority board may remedy the situation as far as Government contracts are concerned.—*Power.*

Hardware Industry Marks Time

There is a sort of inter regnum in the hardware business. Many are waiting to see how the Government price-fixing activities will result. Prices are higher than ever before and judging by the law of supply and demand they will inevitably go higher. Certain lines are dull, such as the hardware used in the building trades; there are evidences of a pause in buying by actual users; but jobbers and retailers are buying way ahead. The real problem will be to supply the consumer and war markets. There is a much greater demand than ever before with a smaller labor supply.—*Hardware Age.*

Women Crowd Engineering Field

Labor shortage is the big problem in the field of industrial engineering to-day. The employment of women is the most prominent solution to date. The Pennsylvania Railroad has engaged 2000 women for work in its lines West of Pittsburgh, and the total number of women in the railroads' employ is probably about 5000.—*Engineering Magazine.*

All Lumber for Government

The chief lumber buyer at the present time is the Government. There are no total statistics available, but the demand for lumber for wooden ships and army cantonments has created an unprecedented activity in the lumber world. Yellow pine is greatly in demand in the East, and the Government is buying fir in the West.—*N. Y. Lumber Trade Journal.*

Government Takes Big Ships

The recent Government order commandeering all ships over 2500 tons is the outstanding feature of the marine world. The object in this move is to clear the way for producing standardized ships. The order includes not only the completed ships of that tonnage but also those under the process of construction. The sum of $750,000,000 has already been appropriated for Government naval work and this will likely be augmented by $500,000,000 more.—*Marine Engineer.*

Shippers Must Have Licenses

The chief matter of interest in the shipping world for the past few days has been the Government ruling that all shippers must have a Government license before the cargoes can be shipped. A great deal of the iron and steel exporting is likely to be held up, especially if it is not going directly to the allied governments. All licenses have to be obtained from the division of export licenses, Department of Commerce.—*American Exporter.*

Wool Trade Makes Offer

The most significant recent move in the textile world is the offer of the Boston wool merchants to give half their wool in tops at the market prices at the close of July. At the opening of our entry into the war the Boston market offered hold prices where they were then for Government purchases. This offer was not accepted, but there are intimations that the present move probably will be viewed favorably at Washington. As prices are constantly mounting, this holding of half the wool represents considerable of a sacrifice on the part of the merchants, as prices are continually going higher.

Another important event in the textile world is that the child labor law becomes effective Sept. 1. This law affects thousands of hands in the textile trade, and in certain sections an extended reorganization of the labor situation may be necessary.—*Textile World Journal.*

Textile Prices to Rise

The feature of the week in textile fabrics is the accentuation of the conditions which tend to a further rise in prices. Prominent among these is the advance of not less than 10 cents a pound in Yokohama for the best grades of Japan silks, with a 10 cent rise in Shanghai and a 30 cent advance in Canton. As a result, some of the New York raw silk dealers have withdrawn quotations and American silk manufacturers have been deterred from naming prices for spring, 1918, although under normal conditions their collections would be opened on Sept. 1.

Buyers of cotton goods are deeply impressed by the further increase in the cost of raw cotton—fully $5 a bale during the week up to this writing and not less than $15 per bale since July 1. With spot cotton selling at 28 cents per pound in New York, buyers of fabrics for converting purposes show greater willingness to purchase even at the new and higher figures, which on print cloth grades range from ⅛ to ½ cent per yd. —*Dry Goods Economist.*

DOBLE BUILDING 2-TON TRUCK

SAN FRANCISCO, CAL., Aug. 4—The Doble Laboratory is completing for production a 2-ton Doble steam truck, regular manufacturing of which will be carried out here. This truck will be followed by a 1000-lb. general utility chassis and a 3½ tonner. These trucks will give results with kerosene as well as gasoline.

Agencies are now being arranged for. The Doble Laboratories were established in 1913 and incorporated under the laws of the State of California, February, 1917, to develop the inventions and patents owned by the company, and maintain a research laboratory, making a specialty of the problems of combustion systems and power plants especially for automobiles, trucks, tractors, motor boats, stationary plants and isolated farm plants.

The company owns the basic patent on the automatic combustion system using kerosene and cheaper oils as a fuel. It is the plan of the company to license to regular automobile and truck manufacturers, etc., to use the Doble system in their products, and to act as advisory engineers in designing the power plant.

Vulcan Spring Plant in Richmond

RICHMOND, IND., Aug. 4—The Jenkins Vulcan Spring Co., St. Louis, will locate a factory here. It will employ seventy-five men and will have a capital of $300,000. It will purchase an 8-acre tract and construct its building.

Sanford Completes 10,000 Mile Run

SYRACUSE, N. Y., Aug. 8—A 3½-ton Sanford truck has just finished its 10,000 mile run. The truck left this city July 5 and returned last week.

U. S. Motor Truck Expanding

Business Increased 1000 Per Cent in Past Year—To Manufacture Trailers

CINCINNATI, OHIO, Aug. 6—The United States Motor Truck Co. is growing rapidly and has increased its business 1000 per cent in the past year. The company, which a year ago had a production of ten trucks per month, now turns out 100 each 30 days and is arranging for a considerably larger business. A progressive assembly plan is to be installed to replace the present group assembly, and a building two stories high and 490 by 90 ft. is to be used for this purpose. The company now employs 250 men as compared with eighty-five a year past. Preparations for expansion include the purchase of two city blocks on which new buildings will be erected, and several new railroad shipping docks to allow for better transportation. The plant is located just next to three railroads and the Miami River, and in consequence is particularly favored as regards transportation.

Plans and specifications are now in process of completion for trailer manufacture and the company anticipates that it will enter into this branch of the industry early in 1918.

At this time the plant covers 353,000 sq. ft. of floor space and includes a body building department, where the drivers' cabs and metal bodies are made; machine shops, assembly floor and stock floor each 420 ft. by 100 ft., besides a large office building. A wise contract allowed the company to purchase $500,000 worth of steel at prices so profitable that it could now sell the steel stock at a profit of $310,000. The stockrooms also contain $450,000 worth of stock materials and parts.

The plant is located in mountainous country which allows for severe testing and the company has extended an invitation to other truck makers to use its facilities and testing roads for all trucks manufactured for the government.

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Hood Rubber Offers Stock

BOSTON, MASS., Aug. 7—The Hood Rubber Co. will offer to stockholders Aug. 11 at par $500,000 new common, in proportion of one new for five existing shares. Rights, which expire Sept. 17, have sold at $5.

The company is raising $1,750,000 new capital on account of business expansion. It has also arranged to issue $1,250,000 additional preferred. Hood Rubber business last year amounted to $11,666,000. Gross sales during the first half of 1917 increased $3,200,000. It is expected that the 1917 gross will exceed $16,000,000.

Production amounts to 700 automobile casings and 800 inner tubes daily.

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Drop Forge Stock for Sale

DETROIT, Aug. 6—The Michigan Drop Forge Co. is offering $50,000 worth of 7 per cent par value preferred stock through investment bankers with a bonus of common stock. The stock is part of a total issue of $250,000 worth of preferred stock the remainder of which has been purchased by interest identified with the company. The company will enlarge the capacity of its plant in Pontiac in the near future. Application has been made to list the stock at the Detroit Stock Exchange.

Security Prices Are Steady

Automotive Issues Show Better Tone with Airplane Stock Featuring Market

NEW YORK, Aug. 7—A better tone developed in the automotive issues last week. Automobile issues especially showed satisfactory gains for that period with few serious losses. Airplane stocks are receiving much attention at present from investors and as a result they are strong. This morning's announcement that the U. S. naval experts have decided to drop the building of chasers is bound to have a depressing effect on the stocks of those companies doing this Government work.

Studebaker directors meet to-day for action on the dividend and there is considerable speculation as to just what action will be taken. Maxwell will hold a meeting in this city this week. This stock last week was strong and showed substantial gains in the three issues.

Hendee Mfg. stock held strong on reports of large motorcycle contracts from the Government for war purposes. It is stated that the United States will probably order 40,000 motorcycles.

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STANWAL BRAKE LINING TESTED ON MT. WASHINGTON

WALPOLE, MASS., Aug. 6—Under the direction of two engineers a test of 501.1 miles was made July 27-28 of Stanwal brake lining on a route to and from the White Mountains with Walpole, Mass., as a starting point. The material tested

Automotive Securities Quotations on the New York and Detroit Exchanges

	Bid	Asked	Net Ch'ge
*Ajax Rubber Co.	66	67	..
*J. I. Case T. M. Co. pfd.	78	84	+2
Chalmers Motor Co. com.	5	10	—4
Chalmers Motor Co. pfd.	..	..	..
*Chandler Motor Car Co.	83	83¼	+2½
Chevrolet Motor Co.	92	95	+1
Curtiss Aeroplane	52½	53¾	..
Fisher Body Corp. com.	40	40¾	+2
Fisher Body Corp. pfd.	88½	90	+3¼
Fisk Rubber Co. com.	74	76	..
Fisk Rubber Co. 1st pfd.	104	106	+1
Fisk Rubber Co. 2nd pfd.	92	95	..
Firestone Tire & Rubber Co. com.	114	119	—3
Firestone Tire & Rubber Co. pfd.	102	105	—1
*General Motors Co. com.	115	115⅛	+2⅞
*General Motors Co. pfd.	87⅞	88¼	+1⅞
*B. F. Goodrich Co. com.	49	50	—1¼
*B. F. Goodrich Co. pfd.	105	106	..
Goodyear Tire & Rubber Co. com.	195	198	—3
Goodyear Tire & Rubber Co. pfd.	105	107	..
Grant Motor Car Corp.	3	6	..
Hendee Mfg. Co.	31	32	..
Hupp Motor Car Corp. com.	2½	3½	..
Hupp Motor Car Corp. pfd.	72	80	..
International Motor Co. com.	5	10	..
International Motor Co. 1st pfd.	30	50	..
International Motor Co. 2nd pfd.	10	20	..
*Kelly-Springfield Tire Co. com.	45¼	49	— ¾
*Kelly-Springfield Tire Co. 1st pfd.	87	95	..
*Lee Rubber & Tire Corp.	21¼	21¾	+ ¼
*Maxwell Motor Co., Inc. com.	34⅝	35¼	+ ⅞
*Maxwell Motor Co., Inc. 1st pfd.	64	65	+3
*Maxwell Motor Co., Inc. 2nd pfd.	24¼	25	+ ¼
Miller Rubber Co. com.	165	175	—5
Miller Rubber Co. pfd.	102	104	..
Packard Motor Car Co. com.	126	132	+1
Packard Motor Car Co. pfd.	94	99	+1
Paige-Detroit Motor Car Co.	25	27	..
Peerless Truck & Motor Corp.	13	15	..
Portage Rubber Co. com.	145	150	—3
Portage Rubber Co. pfd.	..	..	..
Regal Motor Car Co. pfd.	..	22	..
Reo Motor Car Co.	25	27	—1
*Saxon Motor Car Corp.	18½	19⅛	+ ½
Springfield Body Corp. com.	5	15	..
Springfield Body Corp. pfd.	20	40	..
Standard Motor Construction Co.	11	12	+1
*Stewart-Warner Speed. Corp.	61	63	—2
*Studebaker Corp. com.	53⅛	53½	— ⅝
*Studebaker Corp. pfd.	..	96	..
Submarine Boat	28¾	29½	..
Swinehart Tire & Rubber Co.	..	60	..
United Motors Corp.	23⅝	23⅞	+ ¼
U. S. Aero Corp.	6⅝	6¾	..
*U. S. Rubber Co. com	61⅝	62	+ ⅝
*U. S. Rubber Co pfd.	106½	109	+1¼
*White Motor Co.	46½	47⅜	+ ¼
*Willys-Overland Co. com.	32¾	32⅞	+ ⅜
*Willys-Overland Co. pfd.	95⅝	99	+1⅝
Wright-Martin Air Craft	12¾	13½	..

*At close August 6, 1917. Listed New York Stock Exchange.

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS

	Bid	Asked	Net Ch'ge
Auto Body Co.	..	29	..
Bower Roller Bearing Co.	..	36	..
Chevrolet Motor Co.	91	96	+2
Commerce Motor Car Co.	..	10½	..
Continental Motor Co. com (new)	6¼	6⅝	—⅛
Continental Motor Co. pfd.	..	..	..
Edmunds & Jones com.	27½	..	..
Ford Motor Co. of Canada	222	231	+2
Hall Lamp Co.	..	23	..
Hayes Mfg. Co.	..	..	..
Michigan Stamping Co. com.	12¾	13⅞	..
Motor Products	..	..	..
Packard Motor Car Co. com.	..	132	..
Packard Motor Car Co. pfd.	95	99	+ ¾
Paige-Detroit Motor Car Co.	24	25½	..
Prudden Wheel Co.	20	..	—2½
Reo Motor Car Co.	25¼	26	— ½

INACTIVE STOCKS

Atlas Drop Forge	38	41	..
Kelsey Wheel Co.	82	..	..
Regal Motor Car Co.	..	26½	..

was 3/16-in. by 2½-in. lining taken from stock at the factory of the Standard Woven Fabric Co. The product was applied to the service brake bands of a 1914 Cadillac roadster. With the exception of ½ mile the 8-mile descent of the mountain was made with the car's momentum under complete control of the foot brake, the gearshift being in neutral and the emergency brake released. The weight of the car, including three passengers, was 4670 lb. The brake drum was 16 in. The time of the 8-mile descent was 1 hr., 50 min., and the approximate rate of descent 6 m.p.h. The lining showed an average loss of weight for the entire trip to and from Walpole of 22.5 per cent. Temperatures were measured by a thermo-electric pyrometer with a very sensitive mill-voltmeter. The temperatures for the right lining at the end of the first mile down the mountain were 180 deg. Fahr. and for the left lining 252 deg. At the last mile down the mountain the right lining was 484 deg. and the left 482.

The testers were J. T. W. Battis of the company, and Wm. H. Jones of the Massachusetts Institute of Technology.

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Oldfield and DePalma Matched Again

ST. LOUIS, MO., Aug. 7—Oldfield and DePalma will go after the 1-mile dirt track records here to-morrow. Next Saturday they will complete in another match race. To date Oldfield has been victorious in a majority of the matches. The following Saturday, it is planned to match them at the Sheepshead Bay Speedway.

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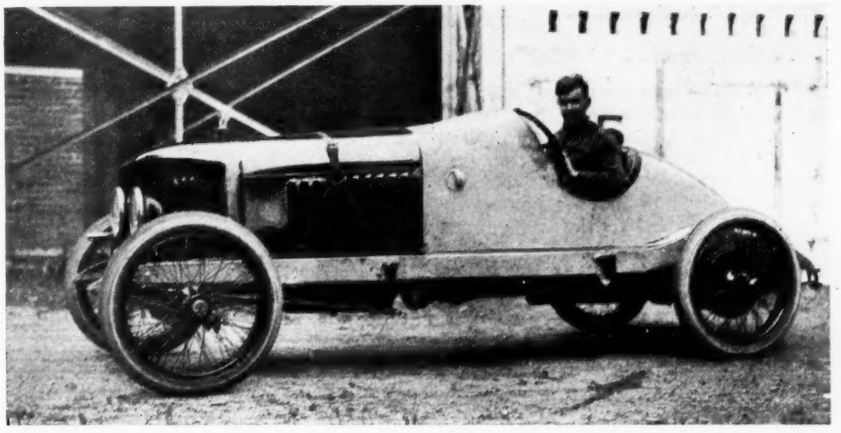
Eastern Dirt Track Racing Revived

NEW YORK, Aug. 7—Eastern dirt tracks will be much in evidence the next few months when a series of automobile races will be run by H. P. Murphy.



Joe Dawson at wheel of record-breaking Chalmers which covered 1898 miles in 24 hr. on the Sheepshead Bay speedway

1898 Miles in 24 Hr.

Chalmers, Driven by Dawson, Betters Former Hudson Mark by 79 Miles

NEW YORK, Aug. 4—Three speedway records were smashed by a Chalmers Record Motor Six to-day on the Sheepshead Bay Speedway. The car, which was driven by Joe Dawson, established a new world's mark of 1898 miles for 24 hr., bettering the old mark of 1819 miles, made by Hudson last year, by 79 miles. The old 1-hr. mark of 77 miles was bettered by 6 miles and a new 100-mile mark was made in 70 min. 45.98 sec., the old mark being 80 min. 21.40.

The car practically made the distance between New York and Denver in the 24 hr., averaging 79 m.p.h., without a single stop of the engine. Thirty-five min. and 35 sec. delay was caused by replacement of tires, oil, water, etc. Not a single repair was done to the engine. The average miles per hr. for the 24 hr., excluding the stops, was 81.09. The actual distance traveled, as ascertained by a surveyor, was 1922.44, or 80.1 m.p.h.

There were twenty-two stops and with the exception of a change of one spark plug no mechanical work was done on the car. An attempt was made by the technical representative to keep an accurate record of fuel, oil and water used, but this was impossible owing to the sloppage each time the car tanks were filled. For this reason the record of stops shows only when these supplies were taken on, although the stop sheets indicate approximately how much of each was taken on.

Hourly Record of Chalmers 24-Hr. Run

Hr.	Miles	M.P.H.	Hudson Mileage	Number Stops	Duration Min.	Duration Sec.
1	83	83	77	0	0	0
2	163	80	154	1	1	32
3	242	79	233	1	3	45
4	324	82	308	1	0	45
5	404	80	389	1	1	21
6	484	80	463	1	1	48
7	563	79	542	1	2	35
8	645	82	616	0	0	0
9	725	80	698	1	2	10
10	801	76	770	1	1	05
11	878	77	850	0	0	0
12	957	79	923	1	1	50
13	1039	82	1004	0	0	0
14	1115	76	1078	1	1	45
15	1194	79	1158	1	1	15
16	1271	77	1233	1	1	55
17	1351	80	1310	1	1	55
18	1429	76	1382	2	1	46
19	1502	75	1461	2	4	06
20	1580	78	1532	1	1	37
21	1660	80	1597	0	0	0
22	1738	78	1669	1	2	0
23	1817	79	1740	2	2	07
24	1898	81	1819	1	0	27

The car used U. S. Royal Cord tires, ribbed treads. One tire, the left front, went through unchanged. There was one blowout. Two tires were changed on the rear wheel. Three tubes were pinched.

The specifications in brief are:

Bore and stroke, 3¼ by 4½.
Pistons, drilled aluminum with Burd rings.
Carbureter, Stromberg, double venturi.
Fuel feed, pressure from rear tank to cowl tank, gravity from latter to carbureter.
Ignition, Remy distributer and battery.
Starting-lighting, Westinghouse, two unit.
Spark plugs, AC with cooling flanges, located over inlet valves.
Gearset, three-speed.
Drive, two-joint shaft.
Rear axle, semi-floating with straight bevel gears. Ratio 3 to 1.
Wheels, SRxB wire balanced. Standard wheel lock.
Driver: Joe Dawson, 19 hr., and Joe Gardham, 5 hr.
Representing the contest board, F. A. Croselmire.
Technical representative of contest board, H. A. Tarantous.
Representing Chalmers company, W. F. Sturm.
Timer, R. A. Leavell.

Abandon Racing for 1917

DETROIT, Aug. 6—The Hudson Motor Car Co. and the De Palma Mfg. Co. have both announced that they will withdraw from racing for the balance of this year. Several Hudson drivers, including Ralph Mulford, Ira Vail and A. H. Patterson, will secure their own cars and enter them under their own names in the Army and Navy Sweepstakes in September.

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Packard Stars at Rochester Hillclimb

ROCHESTER, N. Y., Aug. 1—A Packard driven by Fred Turner made the fastest time on the ½-mile hill at Livonia on July 28, negotiating the ascent in 43 2-5 sec. The hillclimb was held by the Automobile Club of Rochester. The average grade of the hill is 6 per cent. The next best time was 43 3-5 sec., made by a Cadillac, driven by Henry Conolly for cars of 301 to 450 cu. in. displacement. The Packard was entered in the 451 to 600 cu. in. displacement class.

A Maxwell, driven by C. L. Darling, won the event for cars of 161 to 230 cu. in., its time being 48 1-5. A Hudson, driven by F. J. Lennox, made the hill in 44 sec. in the 231 to 300-in. class. The free-for-all was won by a Chandler, driven by Barney Cane, who negotiated the hill in 44 4-5 sec.

Personals

D. McCall White, who resigned as chief engineer of the Cadillac Motor Car Co., Detroit, during the last few days of the Leland administration, has returned to his old office at the request of R. H. Collins, the new president. Following Mr. White's resignation no chief engineer was appointed and his old organization was continued except that he was not present to head it. Under these circumstances he virtually succeeds himself and continues with his own policies. During Mr. White's temporary absence from the engineering chair of the Cadillac company he has been acting in a consulting capacity to all of the General Motors sub-organizations under the leadership of W. C. Durant.

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H. W. Armstrong, sales manager of the Joseph Dixon Crucible Co., Jersey City, has been chosen for the new army.

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R. E. Hayslett, formerly connected with the Timken Roller Bearing Co., is now serving in the capacity of assistant to John Morgan, vice-president and treasurer of the McGraw Tire & Rubber Co., East Palestine, Ohio. R. G. Nelson, formerly assistant sales manager, now serves as director of sales. He will assume direct control over all general office and branch sales. F. C. Strayer has been changed to Atlanta district manager.

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C. T. Chenevert has been appointed vice-president, and M. E. McKenney has been made sales manager of the Denby Motor Truck Co., Detroit. Both have been with the Denby company for some time.

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Walter N. Denman, sales manager for the Brockway Motor Truck Corp. in New England, has been appointed a major in the United States Army and ordered to report at one of the camps to supervise the construction of buildings, etc. Arthur C. Jones succeeds him as New England sales manager.

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H. C. Pfaff has been engaged as sales manager for the Pan-American Motors Corp., Decatur, Ill., coming from Cincinnati, where he was formerly sales manager for the Chevrolet company. Previously he was with the Monroe, Ford and Maxwell sales departments.

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George A. White and **Ray Weeks**, engineers of the Sparks-Withington Co., Jackson, Mich., have joined the engineering forces of the Government.

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F. Griffith, vice-president of the Central Steel Co., Massillon, Ohio, has been made a member of the United States aeronautical committee on steel specifications.

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Leonard Coates, St. Louis, formerly sales and advertising manager of the Banner Buggy Co., has accepted a similar position with the Barnett Sales Co., of that city, manufacturer of commercial bodies for light cars.

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John S. Speck, for the past 6 years factory manager of the Federal Motor Truck Co., Detroit, and previous to that for 2 years with the Oakland Motor Car Co., has been appointed to the position of factory engineer of the United States Motor Truck Co., Cincinnati. Mr. Speck will also act as assistant to E. C. Shumard, chief engineer of the company. He is well known for his record along motor truck manufacturing and engineering lines, having for years been conspicuous in the development of the industry.

New Companies

YORK, PA., Aug. 4—The Gould Motor Parts Co., incorporated under the laws of Delaware with a capital stock of $2,000,000, will shortly begin operations in this city. The company will engage in the manufacture of a new type of differential for automobiles, and will also engage in the manufacture of automobiles and airplanes. The plant of the York Bridge Co., which was purchased by Yorkers at receiver's sale recently, will be occupied by the new company. Employment will be given to between 500 and 600 men within several months.

Walter O. Lum, of this city, formerly connected with the General Electric Co., Schenectady, N. Y., and later with the Westinghouse company at Pittsburgh as automobile and development engineer, will be president and chief engineer of the York industry. Thomas B. Baird, cashier of the York City Bank, is the treasurer of the company. These two men, together with the following, constitute the board of directors: G. Brewer Griffin, manager automobile equipment department, Westinghouse Electric & Mfg. Co., Pittsburgh; John F. Blanchard, president Van Kannel Revolving Door Co., New York; H. T. E. Beardsley, vice-president of the New Amsterdam Casualty Co., New York; James A. Kline, general manager of the Kline Car Corp., Richmond, Va.; W. E. Lennon, assistant secretary Western Union Telegraph Co., New York.

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KALAMAZOO, MICH., Aug. 6—The Victor Wire Wheel Co. has been incorporated with a capital of $500,000 and will manufacture wire wheels for motor cars in this city. Directors are: M. E. Dunkley, Jacob Kindelberger, Dwight L. Seymour, Harry den Bleyker, George B. Pulfer, George McClelland, Louis Rosenbaum, Fred A. Appeldoorn and George Steers. Officers are: President, Harry den Bleyker; vice-president, D. L. Seymour; secretary-treasurer, Fred A. Appeldoorn.

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GREEN BAY, WIS., Aug. 6—The Lawson Aircraft Corp. has been incorporated with a capital stock of $200,000 by Alfred W. Lawson, William Hoberg and George W. Ellis, under whose direction a large plant for the manufacture of complete airplanes was established in Green Bay several months ago. Mr. Lawson is a well known aero-engineer, and his staff includes a number of well known designers, among them John Carisi, formerly of Brooklyn; Lawrence Allison, Lee Wallace and Rudy Sanders. Production is now under way.

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DETROIT, Aug. 6—The Super-Heated Carbureter Co. has been formed with a capital of $50,000, and will manufacture carbureters, engines, tractors and other mechanical devices. Stockholders include S. R. DuBrie, F. L. Sutherland and William H. Turner.

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DOVER, DEL., Aug. 5—The Automotive Corp., which will manufacture engines, boats and automobiles, has been incorporated here with a capital of $10,000,000. The incorporators are C. L. Rimlineger and M. V. Haywood of Wilmington, and C. M. Egner, Elkton, Md.

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FINDLAY, OHIO, Aug. 4—The Star Tractor Co. has been incorporated, with an authorized capital of $100,000, to manufacture tractors of several types. The incorporators are: J. E. Bicknell, C. A. Schubert, C. L. Casterline, Charles E. Jordan and F. H. Gerdeman. A plant will be located near Findlay.

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MILWAUKEE, WIS., Aug. 6—The Western Engine & Dynamo Co. has been organized by John I. Beggs, Chester B. Pierce and Win H. Cameron, to engage in the manufacture of electrical equipment. The new corporation has a capital stock of $200,000. It will employ about 100 men at the outset. The location of the proposed new plant is withheld for the present.

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TOLEDO, Aug. 6—The Lewis Steel Products Co. has been incorporated for $100,000. A factory site is sought in this city and 400 men will be employed when operations start.

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JERSEY CITY, Aug. 4—The Eagle Mfg. Co. has been organized to operate a plant at 18 Morris Street for the manufacture of automobile horns. E. T. Moneleone, 73 Claremont Avenue, heads the company.

Factory

La Crosse Tractor Co. has supplemented its recent offer to the factory employees of a bonus of 10 per cent of their wages from July 1 to Nov. 1, provided they stay with the company throughout the season, with an added bonus amounting to 8 to 10 per cent of their wages for the coming 3 months. This is contingent upon the amount of tractors produced up to Nov. 1 next.

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Doss Rubber & Tube Co., Atlanta, Ga., will build and equip a plant for the manufacture of inner tubes and tires. Between fifty and seventy-five men and women will be employed at the beginning. The tube is known as the Doss puncture closing inner tube. It comprises a greater thickness of body than the ordinary inner tube, with certain uniform undulated corrugated surfaces which, when the tube is inflated, are forced out in a circumferential alignment with the fabric of the casing, placing the rubber of the tube under a constant state of compression, by which means all holes made by nails and other pointed objects are automatically closed, thereby preventing escape of air. The Doss company is now operating a plant in Newark, N. J.

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Racine Motor Truck Co., organized at Racine, Wis., 4 months or more ago to manufacture five types of trucks, from ¾-ton to 5-ton capacities, under the trade-mark of Reliance, is planning to erect a complete new factory, the present quarters at 1109 Sixth Street already being overcrowded. Plans have not been prepared, however. In the new plant the company will manufacture the Piggins internal spur-gear drive rear axle, which is incorporated in the Reliance truck, on a commercial basis.

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Long-Wear Rubber Co., Elyria, Ohio, will commence the manufacture of automobile tires and tubes September 1 and will employ 100 men at the start. The company has purchased a site and is installing the necessary machinery.

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Ajax Rubber Co. of Canada, Ltd., will build a factory in London, Ont., costing $300,000 and employing more than 400 persons.

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United States Motor Truck Co., Cincinnati, is preparing shortly to install progressive assembly lines at its factory. The company will be one of the first to adopt progressive assembly for heavy duty trucks. One of the buildings, 500 by 98 ft. and two stories in height, will be used for this purpose.

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Continental Motors Corp., Muskegon, Mich., is now engaged in filling a large war order for truck motors for the United States Government, and will soon turn out 200 a day. These engines are from 100 to 200 hp. each, and are to be used at the front in France for ambulances, troop trucks and so forth.

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Turbo Carburetor Co., Milwaukee, organized 6 months ago, has completed the equipment of a foundry and machine-shop at 150 Clinton Street, and is manuturing engines.

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Troy Wagon Works, Piqua, Ohio, have received a contract from the French government for automobile trailers, making it necessary to operate the plant day and night for the next 8 months, and possibly for a whole year.

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Marshall Castings Co., Marshall, Mich., has an order from the Doble Steam Car Co., Detroit, for 15,000 sets of castings of sixteen pieces each with a weight of 230 lb. to the set.

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Gilson Mfg. Co., Port Washington, Wis., founder and machinist, has taken a contract for manufacturing 5000 light type garden tractors for the Beeman Garden Tractor Co., Minneapolis.

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Gray Motor Co., Detroit, Cushma Motor Co., Lincoln, Neb., and Fairbanks, Morse & Co., Beloit, Wis., are among the larger makers of gasoline engines which have placed contracts with the Lasure Friction Clutch Co., Watertown, Wis., now operating in its new plant. The Lasure company formerly was situated at Madison, Wis.

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Armstrong Whetstone Co., Lapeer Mich., is producing the Minute Truck, a trailer used to convert a passenger car into a truck rapidly. The trailer sells for $48 and has a capacity of 1000 lb. and a body 42 by 72 by 10 in. The company is also manufacturing a delivery body for Fords with a capacity of 500 lb. The cost is $15. The body is 52 in. long and 34 in. wide with 10-in. sides and 6-in. flareboards.

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Standard Woven Fabric Co., Walpole, Mass., will hold its annual salesmen convention at the factory, Aug. 15 to 17. The program will be made up of conferences, speeches, and entertainment.

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Silvex Co., Bethlehem, Pa., will move into its second plant with facilities that will quadruple its manufacturing capacity. The new plant will give occupation to nearly 1000 men.

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Pan-American Motor Co. plant, now under erection in Decatur, Ill., will be opened about Aug. 15. Invitations will be sent to all stockholders and others interested to inspect the buildings and machinery. The company has decided to put on an exhibit at both the New York and Chicago shows next winter and a new type of closed car will be featured. There will also be an exhibit at the Illinois State Fair at Springfield in September.

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General Motors Corp. plans expansion and it is arranging for the vacation of portions of property in Flint, Mich, on which it will erect new factory buildings.

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Pronovost Torsion Spring Wheel Co., Detroit, plans to establish a branch factory in Midland, Mich. An investment of $25,000 of Midland capital will be required to secure the new industry for this city. The Pronovost company seeks to purchase at least a 10-acre piece of ground with more available land adjoining.

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Michigan Tire & Rubber Co., Coldwater, Mich., will build a two-story, 60 by 300 factory, and also one of 60 by 60 ft. A total expenditure of about $60,000 is involved.

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Holt Tractor Mfg. Co. has been closed for 2 weeks in most departments in order to adjust the operations of the various departments. Shop Manager Robert Keith explained that the plant was ahead in some departments and behind in others, due to variance in the receipt of supplies, and it was necessary to suspend operations and then recall the men as needed to maintain the balance.

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Light Cycle Co., Pottstown, Pa., is having plans prepared for extensions to its plant. The company manufactures castings, automobile parts, etc.

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Tucker Mills, Baltimore, Md., are remodeling and improving property, recently acquired, for the establishment of a plant for the manufacture of automobile tires.

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Edward F. Lyon Co., Detroit, has been equipped to manufacture axle shafts for automobiles.

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Milwaukee Heat Treating Co., Milwaukee, Wis., has changed its corporate style to Wesley Steel Treating Co. in honor of its founder, Charles Wesley, steel expert. The company operates a large carbonizing, case hardening, tempering and annealing furnace plant.

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Maxwell Motor Corp. has moved the New England zone from Boston to Long Island City, and Hoover Holton, who has been in charge here for 2 years, has been transferred to the latter place, as New England and the Eastern section will be consolidated there.

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Automatic Control Trailer Co., which is being financed and managed in Columbus, Ohio, is progressing rapidly. The plant is located in the building of the Broad-Oak Automobile Co. S. A. Kinnear is president of the company

and Thomas E. Curtin, with H. C. Rogers, Columbus automobile men, are interested in the project also. The company builds trailers with an automatic brake control.

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L. Lawrence & Co., Detroit, has opened additional plants at Cleveland and Cincinnati. In Cleveland it proposes working with the service and production manufacturers in salvaging scored and porous cylinders by the Lawrence patent process.

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Inglis Mfg. Co., Milwaukee, maker of oil and gasoline tanks, pumps, measuring devices, etc., has adopted a daylight saving plan which does not involve the actual setting of clocks an hour ahead. With the full consent of its employees, the company has advanced its working schedule until the end of the summer so that work starts at 7 o'clock in the morning instead of 8 o'clock, and the day is over at 4:30 instead of 5:30 o'clock.

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J. C. Gorey & Co. of New York, have placed an order for $11,000 worth of Warner gears for immediate distribution to users in the East. J. C. Gorey who contracted for this business on a recent trip West also signed up to distribute Peru axles in the East; and at the same time opened up negotiations with Golden, Belknap & Schwartz, engine manufacturers, Detroit Gear & Machine Co., Universal Products Co., and the American Rotary Valve Co.

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Lexington Motor Car Co., Connersville, Ind., will consider plans for the construction of a second addition to the plant to be completed this year. The size of the second building as yet has not been decided on. The first addition 100 by 200, will be occupied in about 90 days.

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Olympian Motors Co., Pontiac, Mich., has included a list of special colors in its standard equipment. These include wine, green, blue, red, gray and some models are finished in special Spanish leather.

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Marshall Castings Co., Battle Creek, Mich., has started operations on a contract for the Ford Motor Co. and will make 1000 exhaust pipes per day for the Ford company. The Marshall company has received cores, patterns and driers from the Ford company.

Calendar

ASSOCIATIONS

Aug. 6-10—Convention at Atlantic City under auspices of Cycle Parts and Accessories Assn.

Sept. 25-28—Pittsburgh National Assn. of Purchasing Agents, Convention.

CONTESTS

Aug. 17 — Flemington, N. J., Track Race.

Sept. 3—Uniontown, Pa., Speedway Race.

Sept. 3—Cincinnati, O., Speedway Race, Championship.

Sept. 6—Red Bank, N. J., Track Race.

Sept. 8—Hillclimb, Pike's Peak, for stripped stock chassis.

Sept. 15 — Providence, R. I., Speedway Race.

Sept. 22—Allentown, Pa., Track Race.

Sept. 28—Trenton, N. J., Track Race.

Sept. 29—New York Speedway Race.

Oct. 6 — Danbury, Conn., Track Race.

Oct. 6—Uniontown, Pa., Speedway Race.

Oct. 13—Richmond, Va., Track Race.

Oct. 13 — Chicago Speedway Race.

Oct. 27—New York Speedway Race.

Oct. 24—Columbus, Ohio, Dixie Highway Tour.

S. A. E.

Aug. 6—Motorcycle Division, Atlantic City.

SHOWS

Aug. 6-10—Fremont, Neb., General Tractor Demonstration.

Sept. 2-9—Spokane, Wash., Interstate Fair.

Sept. 9-15 — Milwaukee Show, State Park Fair, West Allis.

Sept. 9-15 — Milwaukee, Wis., Fall Show, Wisconsin

Sept. 17-24 — Grand Rapids, Show, Automobile Business Assn.

State Fair, West Allis, Milwaukee Automobile Dealers.

Oct. 1-6—Buffalo, N. Y., Closed Car Show, Automobile Dealers' Assn., Elmwood Music Hall.

Oct. 13-28—Dallas, Tex., Dallas Automobile & Accessory Dealers Assn. State Fair.

1918

Jan. 5-12 — New York Show, Grand Central Palace, National Automobile Chamber of Commerce.

Jan. 19-26—New York, Motor Boat Show, Grand Central Palace, National Assn. of Engine and Boat Manufacturers.

Engineering

American Railway Master Mechanics' Assn.
American Institute of Electrical Engineers.
Master Builders' Assn.
American Society of Heating and Ventilating Engineers.
Association Iron and Steel Electrical Engineers.
Mining and Metallurgical Society of America.
Society of Automotive Engineers.
Illuminating Engineering Society.
National Electric Light Assn.
National Gas Engine Assn.
American Society for Testing Materials.
American Institute of Metals.
American Foundrymen's Assn.
Society Naval Architects and Marine Engineers.

AUGUST

9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.

10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.

11—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.

13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.

13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.

14—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.

20—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.

21—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

SEPTEMBER

1—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.

8—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.

10-14—Assn. Iron & Steel Elec. Engrs. annual convention at Phila.

10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.

10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.

11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.

13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.

14—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.

15—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

17—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.

20—Mining & Met. Soc. of Amer. monthly meeting N. Y. section at Engrs. Club.

24—Amer. Inst. Metals at Boston.

24—Amer. Fdry. Assn. annual meeting at Boston.

OCTOBER

6—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.

8—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.

9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.

10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.

11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.

13—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.

15—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.

17-18-19—Amer. Gas Inst. at Washington, D. C.

18—Mining & Met. Soc. Amer. monthly meeting New York section Engrs. Club.

20—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

NOVEMBER

3—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.

8—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penna. section at Phila.

9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.

10—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.

12—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.

12—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.

13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.

15—Mining & Met. Soc. Amer. monthly meeting New York section at Engrs. Club.

15-16—Soc. Naval Arch. & Marine Engrs. annual meeting.

17—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

19—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.

DECEMBER

1—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.

8—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.

10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.

11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.

13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn section at Phila.

14—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.

15—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

17—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.

20—Mining & Met. Soc. Amer. monthly meeting New York section at Engrs. Club.